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PROCEEDINGS

OF THE

HAWAIIAN ENTOMOLOGICAL SOCIETY

FOR THE YEAR 1918

HONOLULU, HAWAII
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Volume I of the Proceedings, for 1905-07 (in five numbers), contains 270 pages, 4 plates and 5 text figures.

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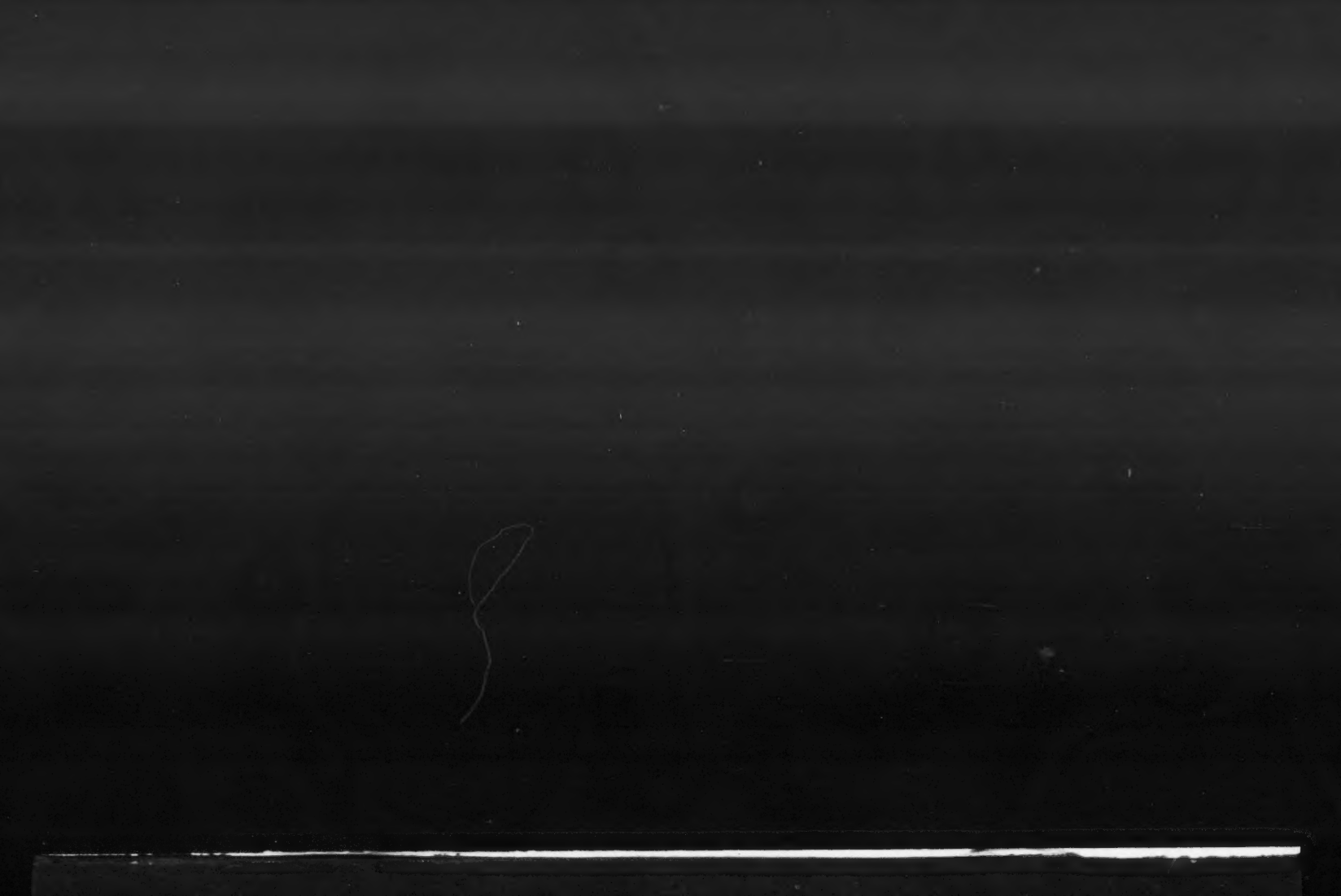

PROCEEDINGS

OF THE

Hawaiian Entomological Society

Vol. IV, No. 1. For the Year 1918. June, 1919.

JANUARY 3rd, 1918.

The one hundred forty-eighth meeting of the Society was held in the usual place, President Pemberton in the chair. Other members present: Messrs Bridwell, Crawford, Ehrhorn, Fullaway, Mant, Swezey, Timberlake and Willard.

Minutes of previous meeting read and approved, with corrections.

ENTOMOLOGICAL PROGRAM.

Lepidoptera from India.—Mr. Mant exhibited a collection of Lepidoptera from Sikkim, India, including one specimen from Aru.

Vanessa tammeamea.—Mr. Swezey reported seeing a Kamehameha butterfly in his garden at Kaimuki. The insect seldom comes down from the mountain forests where its native food-plant (*Pipturus*) grows.

Pantala flavescens.—Mr. Pemberton reported finding a specimen of this dragonfly 15 miles from land in the channel between Oahu and Molokai.

Phora sp.—Mr. Pemberton exhibited a series of a Phorid fly bred from decaying pineapples.

Sierola from Fiji.—Mr. Bridwell reported finding a species

of *Sierola* among material collected in Fiji by Mr. Muir. There are no previous records of the genus in Fiji.

Epyris extraneus in the Philippines.—Mr. Bridwell reported finding this Bethylid in material collected by Mr. Muir in the Philippines. The species was recently described by him from examples collected in Honolulu.

Margaronia exaula.—Mr. Fullaway reported breeding this moth from *Ochrosia* at the Government Nursery.

Lindorus lophanthae.—Mr. Fullaway gave notes on the egg-laying habits of this lady-beetle, which oviposits beneath the scale of *Phenacaspis eugeniae.*

Maui Insect Notes.

BY O. H. SWEZEY.

Dec. 18 to 21, 1917, were spent on Maui sugar plantations investigating leafhopper conditions. At the same time the following insects exhibited were noted and collected, being the first record of their capture on the Island, except in case of the last three.

Epyris extraneus. Two specimens of this recent immigrant were taken, each was on a cane leaf, one at Puunene and the other at Wailuku.

Opisthacantha dubiosa. One specimen taken on a cane leaf at Lahaina.

Pseudogonatopus hospes. Leafhoppers parasitized by this Dryinid were observed in canefields at Puunene, Wailuku and Lahaina. Some cocoons were also found on the leaves.

Helegonatopus pseudophanes. Reared from *Pseudogonatopus hospes* cocoons at Puunene.

Saronotum australiae. Reared from cane leaves collected at Olowalu. Undoubtedly from a Dryinid cocoon on one of the leaves.

Bruchus pruininus. Seven specimens taken on flowers of *Lucaena glauca* at Kihei, Wailuku and Lahaina.

Heterospilus prosopidis. One specimen taken on a cane leaf at Wailuku. It is the introduced parasite on the above Bruchid.

Diachus auratus. Six specimens taken on flowers of *Lucaena glauca* at Lahaina.

Calandra linearis var. *striatus.* Several dead specimens in old tamarind pods at Lahaina.

Schistoceros cornutus and *Sinoxylon conigerum.* Both these beetles found in the branches of a dying Hibiscus in a hedge at Wailuku.

Catorama mexicana. One specimen in tamarind pod at Lahaina.

FEBRUARY 7TH, 1918.

The one hundred forty-ninth meeting of the Society was held in the usual place, President Pemberton in the chair. Other members present: Messrs. Bridwell, Crawford, Fullaway, Giffard, Mant, Swezey, Timberlake, Wilder, and Williams.

Minutes of previous meeting read and approved.

NOTES AND EXHIBITIONS.

Bruchus pruininus.—Mr. Bridwell gave some notes on the habits of this beetle in Honolulu. Mr. Swezey reported having colected it last year at Chico, California, where it breeds in the seeds of the black locust.

Halobates sp.—Mr. Pemberton reported again finding this marine bug numerous along the beach at Waikiki during a heavy "kona" storm. They appear, according to his observation, only when the wind blows steadily from the south for two or three days.

Samoan Insects.—Mr. Giffard exhibited a small lot of insects from American Samoa, collected by Dr. H. C. Kellers,

U. S. N., and transmitted by Governor Poyer. It included moths, butterflies, phasmids, dragonflies, and roaches; also a few Aculate Hymenoptera collected by Professor R. W. Doane at Apia, British (formerly German) Samoa.

Plutella maculipennis.—Mr. Swezey exhibited a series of this moth bred from the pods of *Capparis sandwichensis*, collected on a rocky ledge a little east of Diamond Head. The series presented variations.

Ceratitis capitata.—Mr. Swezey reported breeding seven adult Mediterranean fruitflies from a fruit of *Capparis sandwichiana*, from the same locality as above. It is the first record of this being a host plant for this fly.

Chelonus blackburni.—Mr. Swezey reported on some observations made by him on the habits of this Braconid which indicate that it has similar habits to *C. texanus*, the biology of which was published by Pierce and Holloway in the Journal of Economic Entomology, V, p. 425, 1912. He observed the adults of *Chelonus* flying about an *Amarantus* plant on which *Hymenia recurvalis* was breeding, and saw them apparently ovipositing in the *Hymenia* eggs. Of 11 eggs collected from the plant, only one went thru to maturity and produced a moth. Seven were destroyed by an egg-parasite (*Pentarthron flavum*), and two hatched caterpillars which nearly reached their full growth, spun cocoons, then were devoured by the Braconid larva which had developed inside each of them. On account of being disturbed, the larvae failed to make cocoons and did not mature, tho they developed far enough to be recognized as *Chelonus*, and thus demonstrates the similarity of its life-history to that of *C. texanus* and perhaps other species of *Chelonus*.

Nests of Philippine Wasps.—Mr. Williams exhibited the peculiar nests of certain solitary wasps found in the Philippine Islands, and gave notes on the habits of the builders.

Calligaster sp.—A large nest of several cells covered with leaves. The egg is placed in the middle of the side of the cell, not suspended. The larva is active and is fed from day to day.

Ischnogaster sp.—Forms a link between Vespids and Eumenids. Young fed with nectar. Hair fungus attached to nest.

Ischnogaster sp.—Nest made of decayed wood and very fragile.

Ischnogaster sp.—Pedicel of nest with ant-guard.

A species of *Vespa* goes around breaking down these nests.

Serangium maculiferum and *Cyrema nigellum.* Mr. Fullaway stated that the small black Coccinellid occasionally taken here is known under these two names but there appears to be but one species, for which the first name should be used.

Fruitfly control.—In a discussion of the present state of fruitfly control, Mr. Giffard reported that in Honolulu a great deal more sound fruit is being obtained at present than for some years past, and that he was positive that musk melon crops were ruined by the melonfly as early as 1881, although the fly was not reported here until 1897.

MARCH 7TH, 1918.

The one hundred fiftieth meeting of the Society was held in the usual place, President Pemberton in the chair. Other members present: Messrs. Crawford, Ehrhorn, Fullaway, Giffard, Kuhns, Swezey and Timberlake.

Minutes of previous meeting read and approved with corrections.

Chalcolepidius erythroloma.—Mr. Swezey exhibited an apparently nearly full-grown larva of this large Elaterid beetle which he had found in a dead, partially rotten tree trunk of *Maba sandwicensis* on Niu Ridge, February 10th, 1918. There were termites and lepidopterous larvae in the same tree. Some of the termites were placed in a tin box with the beetle larva and after a day or two were found to have all been eaten. Since then, it has been fed with the larvae of *Adoretus,* eating two or three daily. Thus the predacious habit of this Elaterid is proven.

Capua n. sp.—Mr. Swezey exhibited 6 specimens of a Tortricid moth reared from larvae found on the leaves of *Reynoldsia sandwicensis* in Niu Valley, February 10th, 1918, which is an undescribed species not previously collected.

Thecla echion.—A specimen of this butterfly was exhibited by Mr. Swezey, bred on egg-plant. The larvae were found on the leaves and in the fruit, February 5th. Three butterflies were reared from the material gathered. The species is one of the two species of butterflies introduced from Mexico to feed on Lantana. In 1908, Kotinsky reported having bred one of these butterflies from pepper pods (Proc. Haw. Ent. Soc. II, p. 36, 1909). It may possibly have been this species.

Nesosydne leahi.—Mr. Giffard reported that he and Mr. Fullaway in collecting on Diamond Head slopes, February 24th, 1918, had discovered the macropterous form of this Delphacid.

California Hemiptera.—Mr. Giffard exhibited a collection of Central Californian Homoptera and Heteroptera made by him during the summers of 1916 and 1917, and determined and catalogued by Mr. E. P. Van Duzee in the Proceedings of the California Academy of Sciences, 4th series, Vol. II, No. 11, pp. 249-318, Dec. 31, 1917. The collection enumerates 355 species in all, including a few forms taken by Mr. Gif-

fard in the Sierras, Oregon and Washington. Included in the above, Mr. Van Duzee has described 47 new species. The collection exhibited includes series of a large majority of the species enumerated together with allotypes and paratypes of the new species. All holotypes are in the collections of the California Academy of Sciences.

Ithamar n. sp.—Mr. Swezey exhibited a specimen of bug collected on Niu Ridge, February 10th, 1918, which is undoubtedly a new species of this genus, or a closely related one.*

APRIL 4TH, 1918.

The one hundred fifty-first meeting of the Society was held in the usual place, President Pemberton in the chair. Other members present: Messrs. Crawford, Ehrhorn, Fullaway, Giffard, Kuhns, Osborn, Pemberton, Swezey, Timberlake and Willard. Mr. Van der Goot of Buitenzorg, Java, was a visitor.

Minutes of previous meeting read and approved.

Mr. Joseph Rosa was elected to active membership.

NOTES AND EXHIBITIONS.

Coniocampsa vesiculigera.—Mr. Swezey exhibited five specimens of this Coniopterigid collected by him March 17th at Ewa by sweeping on *Euphorbia* bushes. He stated that he had collected a few specimens at his place in Kaimuki in 1914, which was the first record of its capture in Hawaii.

Pipunculus sp.—Mr. Timberlake exhibited a Pipunculus fly captured March 25th on the window at the Sugar Planters' Experiment Station. It is thought to be the first record of the capture of a Pipunculus in the city of Honolulu, they customarily remaining in their natural habitat in the mountain forests.

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* The same species was taken by Mr. Bridwell at the Nuuanu Pali on *Euphorbia*, June, 1917, and later on *Euphorbia* in Iao Valley, Maui, 1918, by Swezey and Bridwell.

Cerotrioza bivittata.—Mr. Swezey exhibited a specimen of this Psyllid collected by him on Mt. Tantalus, March 29th. This insect has been collected but a few times, first at Opaeula, next at Niu, and now on Tantalus. In each case but a specimen or two were taken, and always on *Xylosma Hawaiiense.*

Hevaheva sp.—Mr. Swezey exhibited specimens of a Psyllid bred from nymphs on *Pelea* leaves from Mt. Tantalus. The nymphs resembled Aleyrodids, and were not in galls the same as other species of *Hevaheva* occurring on *Pelea.* Instead they were situated in slight depressions on the surface of the leaf.

Notes on Java Insects.—Mr. Van der Goot spoke some on insect collecting in Java. He exhibited specimens of a queer Coccid which climbs on the backs of ants and is thus transported by them. He referred to the chief agricultural insect pests in Java: scale insects, caterpillars, and white grubs He stated that the leafhoppers were not injurious to sugar cane, the most important cane pest being the moth borer.

MAY 2ND, 1918.

The one hundred fifty-second meeting of the Society was held in the usual place, Vice-President Timberlake in the chair. Other members present: Messrs. Crawford, Ehrhorn, Fullaway, Giffard, Kuhns, Rosa and Swezey.

Minutes of previous meeting read and approved.

On account of the Treasurer reporting lack of funds sufficient to pay the printing bill for the 1917 Proceedings, Mr. Giffard was appointed a committee to seek financial assistance from the Hawaiian Sugar Planters' Association. It was voted that a bound copy of Vol. III of the Proceedings be procured and presented to the Trustees of the Association.

PAPER.

Insects Occurring on Plants of Lobelioideae in the Hawaiian Islands.

BY O. H. SWEZEY.

The species of this family are not much attacked by insects. Those which do attack them are not particularly injurious to the plants. The fact that so few insects attack the Lobelioideae accounts for there having been less special attention given to collecting insects from these plants than to many others which yield insects in greater numbers.

Some of the insects mentioned below may be specially attached to their respective plants, not having been reared from others; but the records are altogether too meager to state with certainty until more observations are made. The following list is made up from the records of several entomologists: Dr. Perkins, Messrs. Giffard, Swezey, Timberlake and Bridwell.

These records are almost entirely from collecting on the Island of Oahu. If special collecting should be done on the Lobelioideae on the other islands no doubt many more species could be added to the list.

HYMENOPTERA.

Family BRACONIDAE.

Microdus hawaiicola. Bred from *Thyrocopa* sp. in dead stem of *Clermontia.*

A Figitid has been collected on *Rollandia.* It was probably parasitic on a Drosophilid.

LEPIDOPTERA.

Family GELECHIIDAE.

Thyrocopa sp. This moth has been reared from larvae in dead stems of *Clermontia.*

Family *Carposinidae.*

Heterocrossa olivaceonitens. This moth has often been reared from larvae in the fruit and flower buds of *Clermontia kakeana.* It has been reared also from various other kinds of fruits.

Heterocrossa gemmata. This moth has been reared from the flowers and fruit of *Rollandia,* and from the fruit of *Clermontia.*

Heterocrossa crinifera. This species occurs as a leaf-miner in *Rollandia Humboldtiana.*

Heterocrossa sp. An undetermined species reared on one occasion from larva boring in stem of *Cyanea.*

Family Hyponomeutidae.

Neelysia sp. Reared from larvae in dead stems of *Clermontia.*

Hyperdasys cryptogamiellus. This moth was reared from a larva in the dead stem of *Clermontia.* It has been found in dead wood of other kinds as well.

Family Tineidae.

Opogona aurisquamosa and *O. apicalis.* Reared from larvae in dead *Clermontia* stems.

DIPTERA.

Family Agromyzidae.

Agromyza sp. On a few occasions the leaves of *Clermontia persicifolia* have been found mined with the larvae of a fly, but none reared to maturity.

Larvae of some fly have been found in young shoots of *Clermontia parviflora* on Hawaii. Perhaps some Drosophilid or other scavenger.

HEMIPTERA.

Family Delphacidae.

Nesosydne blackburni. This leafhopper has been taken on *Clermontia parviflora,* on Hawaii, but it usually occurs on other plants.

Nesosydne pseudorubescens. This species has also been taken on *Clermontia parviflora,* tho it usually occurs on koa.

Nesosydne lobeliae and *N. montis-tantalus* occur on *Lobelia hypoleuca.*

Nesosydne timberlakei has been taken on *Cyanea truncata.*

Nesosydne wailupensis has been collected on *Rollandia crispa.*

Nesodryas giffardi has been collected in abundance on *Rollandia crispa.*

Family Tettigoniidae.

Nesophrosyne spp. Several species of these leafhoppers have been collected from different Lobelioideae, but they are as yet undetermined.

Family Miridae.

Several species of plant bugs have been collected from Lobelioideae, but they are as yet undetermined.

Family Anthocoridae.

A bug of this family has been taken in hollow dead stems, where in search of prey.

Family Coccidae.

Saissetia hemispherica. Has been found on *Clermontia parviflora* on Hawaii.

COLEOPTERA.

Family Carabidae.

A few of this family are sometimes found hiding or in search of prey in the hollow dead stems of *Clermontia.*

Family Nitidulidae.

Orthostolus robustus, and other beetles of this family are often found very numerous in the flowers and decaying fruits of many if not all species of Lobelioideae. Some are also found in decaying bark of the dying stems.

Family Proterhinidae.

An undetermined species of this family has been reared from larvae in dead *Clermontia* stems. There may be other species also.

Family Scolytidae.

A species of this family has been taken in dead *Clermontia* stems.

Family Curculionidae.

Dryophthorus crassus. This large Cossonid beetle has been taken in abundance in dead *Clermontia* stems.

Oodemas sp. has been taken in similar situations as the above.

ORTHOPTERA.

Family Gryllidae.

Prognathogryllus alatus and *P. stridulans.* These peculiar crickets and other allied species are often found hiding in hollow dead stems of *Clermontia* and other Lobelioideae.

THYSANOPTERA.

Heliothrips haemorhoidalis. Has been collected on *Clermontia parviflora* on Hawaii.

NOTES AND EXHIBITIONS.

Pipunculus sp.—Mr. Rosa exhibited puparia of a Pipunculus fly obtained from leafhoppers on sugar cane at the H. S. P. A. Experiment Station grounds, undoubtedly the same species that was exhibited by Mr. Timberlake at the last meeting,

caught by him on the window at the Experiment Station. Mr. Timberlake stated that the species is near to *P. terryi* of Kauai.

Halymnococcus(?) sp.—Mr. Ehrhorn exhibited the seeds of a branching palm from Egypt which bore specimens of a peculiar Coccid secreting itself under the bracts of the seeds and resembling a sea shell. It probably belongs to the genus *Halymnococcus*. A similar scale has been found on seeds of the native palm (*Pritchardia*) in Hawaii.

Deilephila calida.—Mr. Swezey reported that he and Mr. Bridwell had observed one of these moths at *Metrosideros* blossoms in the daytime on Wailupe Ridge, April 21, 1918.

Cremastus hymeniae.—This Ophionid was first recorded by Marsh in 1910, he having bred it from *Hymenia recurvalis*. Mr. Swezey gave the following list of hosts at present known to him: *Hymenia recurvalis, Nacoleia accepta, N. blackburni, N. monogona, Phlyctaenia calcophanes, P. platyleuca, Phlyctaenia* n. sp. (on *Campylotheca*), *Heterocrossa graminicolor, Cryptophlebia illepida, Tortrix metallurgica, Bactra straminea, Batrachedra cuniculator, Petrochroa dimorpha, Pyroderces rileyi, Ereunetis flavistriata.* A total of 15 species.

Coptotermes.—Mr. Crawford reported this termite having been taken by Prof. Young destroying boxes in a warehouse near the waterfront.

Cryptotermes.—Mr. Crawford reported this termite as taken at the same time as the above destroying shooks in the bundle.

Xyleborus sp.—This Scolytid reported by Mr. Crawford attacking living wood of a monkey-pod tree in Manoa Valley.

Hypothenemus eruditus.—Mr. Crawford reported having bred this Scolytid from twigs of *Amherstia nobilis* last March. The beetles bored thru the central axis of living terminal twigs, killing new growth. The same species was very abundant in dead branches of a monkey-pod tree.

Psyllid types.—Mr. Crawford reported that the types in a

collection of Hawaiian Psyllids of Mr. Giffard's which he had been working up have been turned over to Mr. Giffard who in turn will place them in the Collection of the Hawaiian Entomological Society. The list is as follows: *Trioza lanaiensis, T. pullata, T. hawaiiensis, Hevaheva hyalina, H. giffardi.* The stipulation by Mr. Giffard was that his types should not leave the Territory, altho the Society might itself provide for their disposition in case it could no longer care for them. The remaining of Mr. Crawford's species of Hawaiian Psyllidae have also been turned over to the same collection.

Potassium cyanide inoculation.—Mr. Crawford called attention to a note in Science, page 344, April 5, 1918, in regard to killing Coccidae by inoculating potassium cyanide into trees. He also made some remarks on the very extensive work on Philippine insects and fungi by C. F. Baker, Dean of the College of Agriculture, University of the Philippines.

JUNE 6TH, 1918.

The one hundred fifty-third meeting of the Society was held in the usual place, President Pemberton in the chair. Other members present: Messrs. Ehrhorn, Fullaway, Giffard, Rosa, Swezey, Timberlake, Willard and Williams.

Minutes of previous meeting read and approved.

Mr. Giffard as committee on seeking financial assistance, reported that he had received favorable response from the Trustees of the Hawaiian Sugar Planters' Association. A vote of thanks was extended to Mr. Giffard for his efforts on behalf of the Society.

Committee on Exchanges presented a list of institutions with whom it was considered desirable to offer exchange of publications. It was voted that the Secretary address a letter to each institution inviting an exchange of publications.

PAPERS.

Some Additional Notes on Bruchidae and Their Parasites in the Hawaiian Islands.

BY JOHN COLBURN BRIDWELL.

1. Bruchus sallaei, Sharp, Another New-Found Immigrant.

Acacia farnesiana is one of the immigrant leguminous plants which has found the Hawaiian climate and soils peculiarly well adapted to its needs and is now very widely distributed in the dryer lowlands and lower hills to an elevation of about five or six hundred feet. It is a troublesome spiny shrub which since the time Dr. Hillebrand wrote his account has occupied large areas of pasture lands. In the *Flora* he speaks of it as having occupied areas in the vicinity of the Pearl River Inlet. Its spread is not easy to account for, since the seeds, as large as small peas, do not appear to have any particular means of distribution. It seeds very freely but is attacked by several species of insects which live in the pods and at least three of these are of considerable importance in destroying the seeds. *Cryptophlebia illepida* attacks the pods before the seeds harden and later enters and devours a very large part of the ripening seeds, each larva destroying several seeds *Myelois ceratoniae* feeds in the pods in much the same way. Several other moths and three or four species of beetles feed in the pods which have been injured in this manner but apparently play no part in the destruction of the seeds. The Bruchid *Caryoborus gonagra* enters the pods from eggs laid on the surface and each larva may destroy one or more seeds. These beneficial attacks have been familiar to all Hawaiian entomologists. Having occasion on May 30, 1918, to examine some of these pods to secure material for the study of *Caryoborus gonagra,* I was interested to find the pods containing another Bruchid closely resembling *Bruchus prosopis* in considerable numbers in the Punchbowl district of Honolulu.

Upon examination this proved to be *Bruchus sallaei* Sharp (Biologia Centrali Americana, Coleoptera 5:475, 1885) previously known from Texas, Mexico and Central America. It is the nearest North American ally of *Bruchus prosopis* and would run to that species in my table of Hawaiian Bruchidae (Proc. Hawn. Ent. Soc. 3:466-468, 1918). It may be distinguished by the much shorter scutellum and by the transverse glabrous impunctate area above the eyes. In *B. prosopis* the scutellum is longer than broad while in *B. sallaei* it is broader than long.

While closely allied to *B. prosopis* and like that species possessing an elongate ovipositor in the female, its egg-laying habits are markedly different. Cushman in his admirable "Notes on the Host Plants and Parasites of North American Bruchidae," (Jour. Econ. Ent. 4:489-510, 1911) has described the egg and recorded as breeding from *Acacia farnesiana, Acacia amentacea,* and *Gleditsia triacanthos* in Texas and recorded it as the host of a large number of parasites. He records it as ovipositing on the pods and I have secured oviposition also upon the seeds. The eggs resemble those of *Caryoborus gonagra* but are smaller, and narrower and tend to be laid in groups of 2-5 partly overlapping. Each larva feeds at the expense of a single seed and practically destroys the seed in its development. It pupates within the seed without making any apparent cocoon and the adult emerges by gnawing away a circular disc of the seed coat. Adults placed in confinement with the pods of *Prosopis juliflora* fed upon the sweet substance of the pulp and oviposited though not very freely upon the pods. From these eggs developed in due time small adults. Whether the species will utilize algaroba pods for breeding in the open under natural conditions remains to be seen.

If *Uscana semifumipennis* is an American insect it is not improbable that it reached the Islands with this species since its eggs are parasitized by it.

This Bruchid has so far only been found on the slopes of

Punchbowl though no adequate effort has been made to find it elsewhere.

2. Bruchus obtectus Say under Another Name.

Alfken (Zoöl. Jahrb. Abt. Syst. 19:572, 1904) reports *Mylabris* (*Bruchus*) *mimosae* Fab. as found by Schauinsland at Pearl Harbor during a voyage in the Pacific in 1896 and 1897. This name was formerly incorrectly, as it is now believed, applied to *Bruchus obtectus* Say. Unless the determination was erroneous then the common bean weevil was here as early as 1897. Possibly, however, the specimens may have been *Bruchus prosopis*.

3. Bruchus prosopis.

Adults emerged May 14, 1918, from eggs secured experimentally in pods of *Prosopis juliflora* between Dec. 27, 1917, and Jan. 4, eggs having been certainly laid on the first date. This gives at least 130 days from egg to emergence of adult. The emergence of the adults was perhaps retarded by the dry condition in which the seeds were kept. This is much the longest period observed for the development of Bruchidae in Hawaii.

4. The Dolichos Weevil Identified.

Specimens of the Dolichos weevil transmitted to Dr. Howard for determination were identified by Mr. E. A. Schwarz as *Pachymerus phaseoli* (Gyllenhal)=*Bruchus phaseoli* Gyllenhal (in Schoenherr Gen. Curc. 1:37, 1833). The species was originally described from Brazil and has been reported as introduced into France and Italy. Whether its host plants have been previously reported the literature at hand does not permit me to ascertain. Probably it has spread with its host plant and is not indigenous to Brazil, which is not rich in legumes related to *Dolichos*.

5. Bruchus pruininus.

This species has been bred experimentally from the following additional hosts: *Cassia siamea, Samanea saman, Acacia decurrens, Sesbania coccinea.* and *Cassia grandis.*

Breeding this from the seeds of the monkeypod (*Samanea saman*) is of interest since we have no local record of this species being attacked by Bruchidae, the seeds being protected by the chambered pods with a gummy or syrupy content.

The seeds of *Cassia nodosa* have a copious albumen and the cotyledons reach the seed coat only along their edges. When the eggs are laid immediately over the cotyledons the larvae are able to penetrate into them and develop. When they are placed over the albumen the larvae are unable to penetrate this and perish.

I have retained a lot of infested seeds of *Sesbania sesban* in which this species was breeding for more than a year and the generations have followed one another until the seed are all practically destroyed. There is then no doubt that the species can maintain itself in storage indefinitely.

6. Bruchus quadrimaculatus.

This species was observed on Maui attacking cowpeas in the field. It is a most serious enemy of the cowpea and pigeon peas in storage but does not appear to attack the latter in the field on Maui.

7. Caryoborus gonagra.

A larva of this species successfully completed its growth during February, 1918, in a pod of *Cassia nodosa* by proceeding from one withered undeveloped seed to another.

8. The Two-Spotted Bean Weevil Identified.

As was suggested this species proves to be *Spermophagus pectoralis* Sharp according to the determination of Mr. Schwarz.

9. Parasites of Bruchidae in Storage.

The practical unimportance of parasites in the control of Bruchidae in stored products was illustrated by conditions in Maui. On account of the shortage of labor due to the war some beans, cowpeas and pigeon peas had been neglected and the latter were heavily infested with *Bruchus quadrimaculatus*. They were so numerous that thousands of the adults were sifted out and practically every one of the cowpeas and pigeon peas stored in loose burlap bags had been destroyed, yet the parasites—principally the Pteromalid supposed to be *"Pteromalus" calandrae*—were also present by the thousands. They are, however, important in reducing the numbers of Bruchidae which emerge from the stored products to scatter and infest the stores elsewhere. Properly fumigated cowpeas and pigeon peas, however, which had only the protection of muslin bags were free from Bruchids.

10. Chaetospila elegans Westwood.

This species was taken at Grove Farm Mill, Haiku, Maui, and in part bred out under conditions which make it certain that it parasitizes both *Calandra oryzae* and *Bruchus quadrimaculatus*.

The male as yet undescribed has the antennae 10-jointed. In both sexes wingless and fully winged forms occur with all the intermediate stages between, the degree of wing reduction often differing in the wings of the same specimen.

This feeble species seems of no importance in controlling its hosts.

11. Uscana semifumipennis Girault.

Out of 5,000 seeds picked up principally in Thomas Square in the heart of Honolulu, 3,000 bore eggs of *Caryoborus gonagra* but only six of the larvae reached maturity. Parasitization of the eggs by the Trichogrammatid, *Uscana semifumipennis* Girault seemed to be by far the largest death factor.

On a small lot of pods of *Acacia farnesiana* upon which the eggs of *Caryoborus gonagra* had been deposited in large numbers, taken at Waialua, Oct. 4, 1918, only about 50 per cent of the eggs had been parasitized, leaving enough larvae of the Bruchid to practically destroy the pods. The reason for this smaller percentage was perhaps due to the fact that in this district the only host plants for the Bruchid were *Acacia farnesiana* and *Prosopis juliflora* and these ripen their seed in particular seasons, so that the species does not have continuous breeding places throughout the year and the parasite has a correspondingly limited opportunity for multiplication.

12. Credit Where Credit is Due

The paper in last year's Proceedings, pp. 465-505, was prepared for publication under the pressure of wartime duties in connection with the Selective Service and in the haste of finishing up, it was finally published without recognition of the assistance given me in the preparation of the plant list by Dr. H. L. Lyon, Mr. J. F. Rock and Mr. E. L. Caum. This oversight was particularly regretable since unintentionally certain plants were there first recorded as growing in the Hawaiian Islands. The identifications of all the weedy *Cassias* were made by Mr. Rock.

13. A Correction.

In the discussion of the oviposition reflexes in the former paper on Bruchidae, I had occasion to discuss the habits of a South African Ichneumonid parasitizing *Sarcophaga*. This was referred to under the name of *Allotypa* sp. This is an error. The insect is described elsewhere in this number of these Proceedings as *Atractodes mallyi*.

Some Notes on Hawaiian and Other Bethylidae (Hymenoptera) with Descriptions of New Species.

BY JOHN COLBURN BRIDWELL.

1. Perisierola emigrata Rohwer

This species has been previously known as a predator upon the Pink Bollworm (*Pectinophora gossypiella*), having been bred from that species by Mr. Fullaway in 1911 and later by Swezey, Busck, Timberlake, Pemberton and Willard. On May 30, 1918, while examining pods of klu (*Acacia farnesiana*) I found it abundantly associated with the lepidopterous larvae feeding there. Here were found *Cryptophlebia illepida, Myelois ceratoniae, Pyroderces rileyi,* and *Ereunetis minuscula.* Of these the two former were found attacked under natural conditions while the latter was readily attacked when confined with *Perisierola* and eggs were laid upon the paralyzed larva. *Cryptophlebia* and *Myelois* when full grown are usually too powerful for the *Perisierola* and destroy her with their mandibles when attacked. The smaller ones are, however, usually mastered. The female stings them in three places, in the head region at the throat, and near the middle and at the anal extremity ventrally. Each operation results in violent struggles of the larva during which the *Perisierola* hangs on desperately by means of her mandibles, middle and hind legs and by curving her body tightly about the caterpillar. When one portion of the body is mastered she manipulates portions of it apparently with the object of feeding on its juices.

Oviposition was not observed but apparently takes place an hour or two after she has mastered the larva. The eggs are long elliptical nearly or quite three times as long as broad. They are usually laid flat against the body with their length parallel with it. The number laid seems to bear some proportion to the size of the caterpillar, two eggs having been laid on the little *Ereunetis* larva while eight is a common number

to be placed on the larger caterpillars of *Cryptophlebia* and *Myelois.*

In captivity when placed with other caterpillars the *Perisierola* will attack almost any others besides these. In this way it was bred experimentally from *Ephestia elutella* and *Crocidosema lantanae* and it oviposited upon larvae of *Amorbia emigratella* and *Ereunetis minuscula.* The adults also mastered young Noctuid larvae, the young larva of *Scotorythra rara* and *Hymenia recurvalis,* the larva of *Archips postvittanus* and of *Adenoneura rufipennis,* and the grubs of the Anthribid beetle *Araecerus fasciculatus* and the Bruchid *Caryoborus gonagra.* Upon all of these the adults fed, manipulating the larvae with their mandibles and sucking their juices. If several adults were placed with a small larva they did not oviposit but fed upon them until they were sucked dry.

One female placed with a half-grown larva of *Cryptophlebia* which had already been paralyzed on the evening of May 30 had by the next day laid eight eggs upon its dorsal surface By June 3rd the larvae hatched from these had practically consumed the caterpillar and had reached full growth.

The larva of *Pyroderces Rileyi* was observed vigorously attacking a *Perisierola* placed with it, using its mandibles to bite the abdomen of the wasp. One bit a small *Sclerodermus* placed with it so viciously as to stun it and several with which some *Sierola* had been placed destroyed most of them in a night. Several *Perisierola* placed with a mixed lot of caterpillars from klu pods were destroyed overnight and I have repeatedly had the same thing happen with *Sierola* and *Sclerodermus* placed with other lepidopterous larvae. Lepidopterous larvae do not submit tamely to the attacks of Bethylidae but fight gamely if they have any opportunity.

The Bethylids are cautious in attack and it is probable they frequently attack during the quiescent period at the moults of the caterpillars and thus avoid danger of injury. One female was observed attacking the slender larva of *Ereunetis.* After investigating the head and biting at it and possibly stinging, she

pounced upon its middle and stung it there. This resulted in vigorous contortions of the caterpillar particularly of the anal end. Later she returned to feed at the wound inflicted by the sting. She afterward began working about the thoracic region and apparently succeeded in inflicting a ventral sting near the middle legs after several apparently fruitless efforts in the head region she proceeded to the anal region, where her efforts to sting created another great commotion and contortions, during which she hung on by use of her legs and mandibles and made many attempts to sting but apparently unsuccessfully. She then returned to the head and made several efforts to sting there both dorsal and ventral. The struggles seemed to exhaust her but she remained with the larva which became quiescent. Two hours later she had deposited two eggs.

A female placed with the grub of *Araecerus fasciculatus* after a time attacked it vigorously, the grub making the most violent contortions in its attempts to dislodge the *Perisierola*. She had attacked it at the anal extremity and was keeping hold with her mandibles and hind legs and was constantly attempting stinging. Both finally became exhausted and when the grub was becoming quiescent the *Perisierola* attempted to pierce the skin of the mid-ventral region and apparently succeeded and fed and then rested for some time on the grub now straightened out on its back. From time to time she would abandon the grub and run away, but always returned.

2. Sierola Attacking the Larvae of Cryptophlebia vulpes in the Young Pods of Acacia koa.

Where the ridge leading from Punchbowl to Mt. Tantalus joins the latter and the sharp ascent up to the Tantalus peak begins there are a number of koa trees upon which I have never failed to find adult *Sierolae* whenever looked for, but until June 23, 1918, I had not been able to find to what lepidopterous larvae they are attached. Sweeping the foliage and opening the young pods of the koa then revealed the presence of four species of *Sierola* upon the *Acacia koa* and one at least

of these is attached to the larva of *Cryptophlebia vulpes* as a predator. This moth lives as a larva in the immature pods of the koa, feeding at the expense of the young seeds. During its development the larvae frequently cut their way out of the green pods and enter fresh ones. They finally pupate in the pods from which they have eaten out the seed. The *Sierola* enters the cavity in which the caterpillar has devoured the seed and oviposits upon the larva after stinging it and stupefying it. The larvae completely destroy the caterpillar and from five to seven of them can find food from one larva. Upon reaching full growth they spin silken cocoons within the empty seed cavity and the adult *Sierolae* emerge about the time the pods begin to ripen and change color. In all the pods where *Sierola* larvae and coccoons were found were openings apparently made by the *Cryptophlebia* larvae in entering one pod from another. While I have not been able to make out the details of the stinging of the *Cryptophlebia* larva, the general aspect of the conflict between them is much like that between *Perisierola* and its prey, the *Sierola* attacking with great fury and hanging to the prey with legs and mandibles. They also feed on the juices of the prey as do the other Bethylidae observed. I have seen no indication that they linger with the prey during the larval development.

The koa pods are also injured by the larvae of *Cryptophlebia illepida* and of *Adenoneura rufipennis*. *C. illepida* is too large to be readily mastered by the *Sierola* but doubtless the larvae are occasionally utilized.

The larvae of the species of *Cryptophlebia* attack the koa pods in a later stage of development than *Adenoneura*. The larvae of the latter emerge from the pods and hide elsewhere to pupate. They are also probably used occasionally by the *Sierola*.

A larva supposed to belong to *C. vulpes* was mastered by the *Sierola* and five eggs laid by June 25. These eggs are elliptical in outline perhaps 2 1/2 times as long as broad and rather large in proportion to the mother insect. They are con-

siderably stouter than the egg of *Perisierola* but are more slender than those of *Sclerodermus manoa,* and *S. immigrans.*

While four species of *Sierola* were represented in the material secured from the koa, only one of these has been surely associated with the *Cryptophlebia* larvae in the pods. Much of the material taken from the foliage of the koa belonged to another species which was taken frequently enough to assure its association with some koa insect but no indication was found as to which one.

Another species of *Sierola* was bred (2 ♀ and 1 ♂) on June 5, 1918, from a lepidopterous larva living within the hollow twigs of recently dead *Clermontia kakeana.** The material was taken as full fed larvae on May 26, along the Manoa cliffs trail on the side of Tantalus in the S. E. Koolau Mountains of Oahu. These spun their coccoons on May 27. The coccoons are elliptical rich brown in color and are rather closely woven. They lie nearly touching attached to the inner surface of the wood in the pith cavity.

These species of *Sierola* are in the hands of Mr. Fullaway who is revising the Hawaiian species.

3. Sclerodermus immigrans Bridwell.

One ♀ was found on June 11, 1918, at the type locality and on being placed with *Caryoborus* larva showed much interest and attacked it with its mandibles. The details of the attack were not noted at the time but the *Sclerodermus* was seen to gnaw at the larva in the mid-ventral region apparently with the object of starting a flow of juices. There was a marked preference for the active, full-fed larva over the prepupal stage. Though eggs were seen laid up to June 12, but some were laid after that date and the larvae reached full growth, but no adults were bred out from them. This female was kept alive until July 24, being fed exclusively upon the juices of the larvae of *Caryoborus* and other larvae.

* From material of the same origin brought down at the time Mr. Swezey bred *Thyrocopa* sp. and *Neelysia* sp.; he has also bred from similar material *Opogona aurisquamosa* (Butler).

4. Some Endemic Hawaiian Species of Sclerodermus Latreille.

The first species of this genus was described in 1809 under the name of *Sclerodermus domesticus* (Latreille Gen. Crust. & Ins., 4:119 ♀) and the genus described the following year under the same name (Consid. General, etc., 314). It was altered by Westwood in 1839 to *Scleroderma* in which alteration he has been followed by subsequent writers. We here revert to the original spelling believing that emendations, except for names specifically stated by the author to be misprints, are never admissible.

The first species of the genus from the Hawaiian Islands was described by Sir Sydney S. Saunders under the name *Scleroderma polynesialis* (Tr. Ent. Soc. Lond. 1881:116 ♀). In 1901 Ashmead described as new five (Fauna Hawaiiensis 1:283-286) and tabulated the six supposed species. Dr. Perkins in 1910 (*Op. cit.* 2:612-614) added four more species and the present writer in 1918 added an immigrant species (these Proceedings 3:484). All these species with the exception of one of Ashmead's appear to be valid, though they are uncommon and not easily discriminated. In the course of recent years a number of specimens have been taken, and a few bred, some of these appearing to be new. At present I can say but little of the distribution of the species on the various islands since there appear to be but three individuals in the collections here besides those taken on Oahu. Of these one is the immigrant *S. immigrans* Bridwell, the second appears to be *S. polynesialis* Saunders, while the third is distinct from anything known from Oahu.

In the mountains of the Hawaiian Islands are found numerous elongate caterpillars which have the aspect of Cerambycid beetle larvae and have somewhat the same habits usually affecting wood which has reached a condition of white dry rot. These belong to the genera *Semnoprepia, Hyperdasys,* and *Hyposmocoma.* Being somewhat difficult to breed in the low-

lands our knowledge of them is somewhat limited It is from these caterpillars that all our endemic *Sclerodermus* have been bred.

Sclerodermus polynesialis Saunders.

I am unable to distinguish Ashmead's *S. Perkinsi* from this species, the supposed differences being apparently due to the difference in the conditions of the specimens, the length of the abdomen and the color of the sutures differing with the condition of the specimen.

If my determination is correct this is the species most commonly found on Oahu and has been frequently bred by the author from wood-boring lepidopterous larvae. I have at hand 19 ♀ of this species, all but one of which were secured in the mountains back of Honolulu, one by W. M. Giffard, one by D. T. Fullaway, two by O. H. Swezey and the remainder by the author. I have also a single ♂ bred out with females of this species. A single ♀ was taken by Mr. Swezey in Iao Valley, Maui. The type locality of *polynesialis* was Mt. Haleakala. Maui.

The species is quite variable in size. The thorax is dark piceous but the coloration of the insect is such that it seems black considerably darker than any other of the species I have seen from Oahu.

There is no trace of ocelli in this species.

Sclerodermus poecilodes Perkins.

There are before me two taken in Waialae Nui, Oahu, by Mr. Swezey and two from Tantalus (Bridwell), both lots associated with larvae supposed to be those of *Semnoprepia*, in the dead stems of *Smilax*.

Sclerodermus kaalae Ashmead.

There is before me a single ♀ which I doubtfully refer to this species in which the head and thorax are piceous, the legs and antennae brownish yellow and the abdomen appears black. The margins of the tergites are testaceous but so closely ap-

plied to the following tergites as to show no difference in color. This resembles *polynesialis* but the clypeus is less produced and the abdomen is distinctly tessellate but more feebly so than the thorax. The head also seems more strongly tessellate than in the other species. There is no trace of ocelli.

One ♀, Mt. Kaala in the Waianae Mts., Oahu (Bridwell).

Sclerodermus manoa n. sp.

♀ This species differs from any wingless female *Sclerodermus* known to me except *semnoprepiae*, by its fully developed ocelli. These are arranged in an acute triangle, the hind ocelli distant from the occipital margin about as far as from the anterior ocellus and about six times that distance from the eye margin.

Testaceous yellow; eyes black, tips of mandibles, sutures of flagellum above, extreme base of first tergite very slightly, sublateral patches on its disc, submedian lateral triangular area on either side the second, and similar basal lateral areas on third and fourth, the sixth entirely and the sixth sternite basally slightly infuscate.

Clypeus produced about as long as broad, tectiform, its apex nearly truncate, simple, the sides sraight.

Head more finely tessellate than the thorax and a little more shining. Thorax subopaque from the strong tessellations, sides of pronotum and of propodeum longitudinally lineolate tessellate; the mesopleura with finer tessellations similar to those of the dorsum. Propodeum distinctly narrowed at base, the declivity obliquely truncate.

Abdomen elongate ovate broader than thorax about as wide as the head, highly polished and shining, the hind margin of the first tergite in the arc of a circle, the tergite not quite as wide as the second, measuring where the suture touches the lateral margins.

Length about 3 mm.

This *Sclerodermus* was found in a cavity in a small stub of white rotten wood, probably the remains of a bush of *Scaevola chamissoniana* along the Manoa cliffs trail in the mountains back of Honolulu on May 26, 1918. It was there associated with a limp immobile lepidopterous larva supposed to be that of a species of *Semnoprepia*. The *Sclerodermus* and the caterpillar were placed in a glass tube and brought in for observation. On the next day she had laid five eggs scattered about on the glass of the tube. The eggs were short ellipsoidal, perhaps twice as long as broad, very large in proportion to the size of the adult, and the poles were very slightly different.

On May 29, only four of the five eggs could be accounted for. One had hatched and the larva was attached to the *Semnoprepia* larva and this one alone of the progeny reached full larval growth and it failed to spin its coccoon and transform. A second larva had hatched and was transferred from the glass but failed to develop; this was true of the third larva as well and the fourth egg was unhatched and did not hatch.

The female *Sclerodermus* showed much interest in the caterpillar, the egg and the young larvae, working over them all with her maxillae and palpi. At one time she appeared to be trying to remove the egg from the glass to the caterpillar. More than once she seemed to be trying to bite into the caterpillar for the young larvae. It seems probable though that she was attempting to feed on the juices exuding from the wound made by the feeding of the young larva. By May 31, three new eggs had been laid and only a single larva remained from the first lot of eggs. This was feeding from the abdomen of the caterpillar just in front of the first pair of prolegs. The effects of the adult *Sclerodermus'* feeding was seen in the shrinking of the caterpillar, which was considerably greater than the feeding of the larva would account for. By June 3 the larva was nearly fullgrown and the eggs had not hatched. The caterpillar was greatly shrunken in the middle as the result of the feeding of the *Sclerodermus* larva. The adult was still living and was removed and placed with a larva of *Cryptophlebia illepida* which had been stung by *Perisierola*. She began to eaxmine the anal extremity of the larva with her mandibles and seemingly finding it too active, since it gave a sharp but slight jerk, she reversed and attempted clumsily and slowly to sting it while straight, a posture well adapted to the natural host caterpillar in its burrow but not for the caterpillar lying free in the tube. This operation was repeated several times in a few minutes.

On June 9 a larva* of apparently another genus but the same wood-boring type was brought from the mountains and

* This larva was injured or partly drowned.

placed on June 10 with the ♀ *Sclerodermus*. She showed great interest in it and attempted stinging it but did not succeed while under observation. Her efforts at this time were more of the type of the *Perisierola* than previously. It is evident that sucking the juices of the larval prey is her means of subsistence. By June 13 three eggs had been laid. The larva from the former lot of eggs which reached full growth failed to spin a coccoon or pupate. The female remained alive from May 26, when she was taken, until June 29 feeding readily upon the juices of any caterpillar given her but ovipositing only upon her natural prey. These were always given her paralyzed as a precaution against injuring her. Had circumstances permitted securing proper food for her and her larvae I have no very great doubt that she might have remained alive much longer and that her young might have been bred through to maturity. She did not even refuse to feed upon the juices of the larva of the Bruchid *Caryoborus gonagra*.

Described from a single ♀. Manoa cliffs trail, Mt. Tantalus, Oahu, Hawaiian Islands, May 26, 1918 (Bridwell). Type in the collection of the Hawaiian Entomological Society.

Sclerodermus semnoprepiae n. sp.

♀ Head piceous black; the mandibles piceous, the antennae, thorax, abdomen and legs pale yellow testaceous, flagellum, front coxae and the propleura in front of them and the sutures of the thorax above, sometimes very slightly, petiole, the basal margins of tergites 2-7 seen through the hyaline margins, sting sheath, margins of sternites 2-5 similarly and rest of venter except the last tergite slightly infuscate.

Clypeus triangularly emarginate, the sides not so strongly produced as in *polynesialis*. Ocelli well developed in an equilateral triangle, the posterior ocelli a little further from the eye margin than from the front ocellus and about six times as far from the eye margin.

Head shining tessellate; dorsum of thorax a little less shining more strongly tessellate; sides of pronotum and propodeum longitudinally, mesopleura, vertically lineolate-tessellate; abdomen with the tergum transversely lineolate-tessellate.

Propodeum similar to that of *manoa* but shorter.

Length about 3.25 mm.

♂ Black; legs and antennae infuscate, the margins of the tergites testaceous; wings subhyaline apically slightly grayish, the veins yellowish translucent.

Antennae 13-jointed, the joints of the flagellum except the last subequal a little broader than long, the last nearly as long as the two preceding joints together. Posterior ocelli about as far from the occipital margin as from the anterior ocellus and about three times as far from the eye margin. Eye about one and one-half its length from the occipital margin.

Pronotum strongly narrowed anteriorly about as long as the mesonotum; mesonotum without furrows; scutellum with a transverse suture at base; propodeum about as long as the scutellum and mesonotum together. Wing with a closed median cell the submedian entirely open behind; transverse median interstitial with the basal, there is no trace of venation beside the subcosta, median, and these, which are well developed. Length 2.5 mm.

Described from 12 ♀ and 7 ♂ bred Dec. 1916 from sticks of the living wood of *Coprosma longifolia* attacked by the larvae of an as yet undescribed species of *Semnoprepia* brought down from the windward side of Mt. Konahuanui, Oahu (O. H. Swezey). The species was ascertained to be a predator upon the larvae of this moth.

Type and allotype ♂ in the collection of the Hawaiian Entomological Society. Paratypes in the collection of the Hawaiian Sugar Planters' Association and in the private collections of P. H. Timberlake and of the author.

This species is closely related to *manoa* but the dark head will easily distinguish it. The structure of the clypeus is also different.

The undescribed ♂ of *polynesialis*. is very similar but in that species the antennal joints are longer, the abdominal markings are more extensively pale and the venation less strongly developed.

Sclerodermus chilonellae n. sp.

♀ Very similar to *semnoprepiae* but the ocelli rudimentary, the sides of the mesothorax and propodeum the extreme base of first tergite and sides of the abdomen dark, the legs and antennae clear pale yellow. The head varies from reddish to nearly black.

The clypeus is round in front and somewhat expanded. Length about 3 mm.

♂ Similar to that of *semnoprepiae* but the general coloration piceous, legs yellow, antennae yellow infuscate, two yellowish suffused spots on

the base of the scutellum; sutures of the abdomen broadly pale. Length about 3 mm.

Described from five ♀ and 1 ♂ bred by O. H. Swezey from the larva of *Hyposmocoma chilonella* in the rotten wood of *Pipturus* on the Manoa Cliffs trail, Mt. Tantalus, Oahu, May 13, 1909, and from five ♀ bred with others from rotten wood by D. T. Fullaway on Tantalus probably from the same host and even the same tree.

Type ♀ and allotype ♂ in the collection of the Hawaiian Entomological Society; paratypes in the collection of the Hawaiian Sugar Planters' Association, and in the private collection of D. T. Fullaway and of the author.

Sclerodermus Muiri n. sp.

♀ A black appearing species closely resembling *S. polynesialis,* the propodeum less narrowed basally and the clypeus less produced, slightly emarginate in the middle. The sculpture much like that of *manoa.* Head without any trace of ocelli. Length about 2.5 mm.

Described from one ♀ collected at Kilauea, Hawaii (F. Muir) from the collection of W. M. Giffard. Type in the collection of the Hawaiian Entomological Society.

Sclerodermus tantalus, n. sp.

♀ Head testaceous brown, thorax yellow the mesonotum, mesopleurae and sides of propodeum brownish, abdomen piceous black, the margins of the tergites translucent, legs and antennae yellowish.

Head without any trace of ocelli, the occipital distance more than twice the length of the eye, antennae not at all elongate as compared to *poecilodes.*

Head feebly tessellate, thorax more strongly so, abdomen feebly tessellate more strongly on the declivity of the first tergite. The tessellations of the sides of the pronotum are not so long as those of *polynesialis,* the mesopleura coarsely tessellate but the lines bounding the tessellation are not so much impressed as those on the dorsum; sides of propodeum lineolate-tessellate.

The clypeus is not so strongly produced as in *polynesialis* and the anterior margin is inclined to be reflexed. Length about 2.25 mm.

I was at first inclined to identify this as *euprepes* but that is evidently a larger species with the antennae longer and the occipital distance less.

Described from one ♀ collected on Mt. Tantalus, Oahu (Bridwell). Type in the collection of the Hawaiian Entomological Society.

5. Two Cephalonomia Species in Stored Feeds.

Cephalonomia hyalinipennis Ashmead.

What is believed to be this species was found abundantly in the Grove Farm mill, Haiku, Maui, in August and September 1918 upon rolled barley recently imported from California. All the examples taken proved to be ♀'s.

Cephalonomia gallicola Ashmead.

A yellow wingless ♀ found upon the same barley in much smaller numbers agrees with the description of this species and of *C. Xambeui* Giraud. The former was originally bred from galls in Florida and the latter from *Ptinus fur* in a mattress in France. Probably they are the same species. This species and the former when placed with small Tenebrionid larvae taken from the feeds and with the caterpillars of *Ephestia elutella* from the same feeds showed no interest. They were decidedly interested in and attacked the larvae of *Bruchus quadrimaculatus* and *Calandra oryzae* but did not oviposit upon them. They were possibly preying upon the larvae of *Sitodrepa panicea,* adults of which emerged in small numbers from the bags of barley.

6. A New Philippine Goniozus.

Goniozus Williamsi n. sp.

Closely related to and resembling *Goniozus triangulifer* Kieffer by the description but the metanotum with parapsidal furrows and the scutellum with small basal pits on either side and the subcosta, parastigma, and stigma yellowish translucent. The lateral areas of the superior face of the propodeum are finely obliquely aciculate.

♂ The anterior femora of the male are pale brownish yellow and the eyes are larger than in the ♀.

Lenth 2.5 mm.

Described from 4 ♀ and 1 ♂ bred by Mr. F. X. Wil-

liams from a group of lepidopterous larva, probably Pyralid, taken from the foliage of a plant, Los Banos, P. I., Jan. 1917. The coccoons which have been preserved in spirits are stramineous and are spun together in a compact mass 2 x 8 mm.

Type ♀ and allotype ♂ in the author's collection; paratypes in the collection of the Hawaiian Sugar Planters' Association.

7. A Subapterous Bethylid from California.

Arysepyris californicus n. sp.

♀ Black; antennae yellow infuscate from the middle of the flagellum on, mandibles piceous at apex, middle and hind trochanters, all the tibiae and tarsi (the middle and hind tibiae suffused with fuscous in the middle) yellow, first tergite with a lateral subapical suffused piceous spot on either side.

Head much broader than the thorax, a little narrowed behind, the occipital distance about equal to the length of the eye; ocelli in an isosceles triangle, the hind ocelli much nearer the ocipital margin than to each other and about five times as far from the eye margin; face carinate between the eyes, the carina not reaching beyond the posterior margin of the lateral (antennal) depressions of the face.

Head and dorsum of thorax strongly and coarsely (microscopically) tessellate, the head evenly punctured with distinct shallow punctures removed from each other about five times their diameter.

Pronotum about as long as the mesonotum and scutellum together, the propodeum a little longer; mesonotum transverse twice as broad as long; scutellum with a narrow transverse sulcus at base, propodeum with the superior face rounded down to the declivity, the microscopic sculpture of the superior face radiating from a longitudinal, smooth area, those on the declivity malleate in appearance. Wings reaching nearly to the middle of the superior face of the propodeum, subovate, rounded at apex, with a costa.

Tergites of abdomen highly polished and shining, with faint transverse lineolations. Length about 4 mm.

Described from one ♀ collected in the sand dune district of San Francisco, Cal., Sept. 8, 1910 (Bridwell). Type in the author's collection.

Arysepyris as a convenience genus established for the reception of subapterous forms which cannot be referred to *Goniozus* and its allies the characters of these genera being mainly venational.

8. Another Philippine Chlorepyris.

Chlorepyris similis n. sp.

♀ Resembling closely and closely allied to *C. flavipennis* Kieffer but differing in the more shining integument of the head and thorax and the finer and sparser puncturation of the head, largely impunctate behind the ocelli, the finer and sparser puncturation of the pronotum, the shorter pronotum and propodeum, and paler, more elongate stigma of the wings, and the paler flavo-piceous tibiae and tarsi. Length 7 mm.; wing 5.5 mm.

♂ The male closely resembles the female. The antennae and legs are more slender and the abdomen smaller, as is characteristic for males.

Length 7 mm.; wing 5 mm.

Described from one ♀ and one ♂ collected at Los Banos, Luzon, Philippine Islands (F. X. Williams). Type and allotype in the author's collection.

9. A New Peregrine Sclerogibbine Bethylid Genus from the Hawaiian Islands.

Lithobiocerus n. gen.

Apparently related to *Mystroconemis* Kieffer but with the mesothorax strongly contracted into two unequal lobes and with the legs differently developed.

Head flattened above, suboval in the dorsal aspect, truncate behind. The eyes coarsely facetted, rounded, hairy, reaching to the occiput and diverging anteriorly; ocelli none; front produced over base of antennae concealing the antennal sockets and clypeus, its anterior margin revealed snoutlike between the bases of the antennae; antennae inserted between the frontal process (anteriorly) and the clypeus (posteriorly); clypeus declivous, tectiform, carinate at its extreme base, swollen in the middle, its base anterior to its apex. Antennae stout, tapering, 25-jointed, the joints broader than long; labial palpi elongate 6-jointed.

Prosternum massive plane, declivous in front; pronotum arcuately emarginate behind, narrowed behind, about twice as long as broad at base, a little longer than the propodeum, twice as long as the mesonotum; mesonotum contracted before the middle. Propodeum broader posteriorly, obliquely truncate without ridges or carinae. Front tibiae and femora strongly incrassate; hind and middle tibiae about the length of their femora, the front tibiae about one-third as long as its femur and somewhat spoon-shaped. Anterior tarsus with large conspicuous pulvillus between the ungues, inconspicuous on the hind and middle legs; ungues with a subapical tooth; calcaria feeble 1-1-2, those of hind legs unequal. Type *Lithobiocerus vagabundus* Bridwell.

Lithobiocerus vagabundus n. sp.

Front of head and antennae reddish testaceous, the flagellum above infuscate toward the apex; rest of head black, thorax and legs yellowish testaceous, abdomen black, the margins of the tergites, apical tergite, and the margins of the sternites broadly reddish testaceous.

Impunctate and without visible sculpture, the entire body including the eyes, antennae and legs covered with fine rather close short pile.

Length 3.5 mm.

Described from one ♀ collected on the veranda of a house beneath which some mixed feed had been stored in Kaimuki, Honolulu, Dec. 23, 1916. Type in the author's collection.

Undoubtedly an immigrant, possibly from the Orient, where some of its allies are found. Whether it is in any way related to the winged male imperfectly described generically by Ashmead as *Probethylus Schwarzi* will require investigation. It is to be hoped that this form, one of but two ♂'s known in the subfamily, will be described by one of the hymenopterists who have access to Ashmead's material.

10. Cleptes from the Pacific Coast.

The genus *Cleptes* has been variously referred to the Chrysididae and the Bethylidae and to a family of its own related to the two. Certainly it seems more similar to Bethylidae than to the Chrysididae, differing from them largely by the greater development of the true metanotum and the reduction of the apical segments. On the other hand they are about as far removed from the true Chrysididae in the development of the metathorax and the abdominal segments as they are from Bethylidae.

The habits of none of our North American species have been observed. The European species so far as known attack the larvae of saw flies after they have coccooned.

Cleptes aliena Patton.

One ♂ collected June 8, 1910, Josephine Co., Oregon (F. W. Nunenmacher).

Cleptes Blaisdelli n. sp.

♂ Length about 5.5 mm.; width of thorax about 1.5 mm.; length of wing 4 mm.

Abdominal segments 1-3 ferruginous; flagellum, mouthparts, anterior trochanters, knees, tibiae, and tarsi; middle trochanters femora, tibiae, and tarsae, hind trochanters, tibiae, and tarsi, and 5th abdominal tergite nonmetallic, 5th tergite and tarsi more or less piceous, the rest dull black; calcaria testaceous.

Head, thorax and abdomen in general finely and sparsely punctured.

Propodeum coarsely and deeply reticulate at its anterior middle, the ridges evanescent posteriorly and laterally, its posterior margin nearly straight and its angles produced not quite even with the middle, dentiform but not strongly so, sides of propodeum smooth and shining, 1st tergite smooth and shining; 2nd tergite smooth with fine deep evenly placed punctures, 3rd and following finely rugulose with confluent setigerous punctures. Wings brownish, tegulae metallic with a brown posterior discal spot.

Described from one ♂ collected by Dr. F. E. Blaisdell May 15, 1884, at Poway, Cal. Type in the author's collection.

This fine species does not resemble any of the described American species, the red abdomen abundantly distinguishing it.

Cleptes purpuratus Cresson.

The account of this species in Aaron's Chrysididae is misleading. The abdomen of the female is not at all similar in color to the thorax and in the ♂ the reflections are feeble.

♀ Head, thorax and legs to the femora metallic green with various cupreous and golden reflections, the propodeum blue green, antennae legs beneath the metallic reflections and the abdomen piceous brown, the tibiae and tarsi more testaceous.

Head and pronotum rather coarsely and sparsely punctured, the surface between somewhat uneven, but highly polished and shining; the surface of mesonotum smooth highly polished and shining with finer sparser punctures, scutellum much the same, the punctures obsolescent, metanotum with the lateral depressed areas or pits dull, blue, propodeum with the superior face irregularly reticulate throughout with two fine converging carinae about one-third the distance from the sides to the middle, its posterior carina well defined nearly straight, the lateral angles dentiform; mesopleura polished, rather sparsely coarsely punctured, metapleura and sides of propodeum striate.

Abdomen flattened above, highly polished, particularly the impunctate 1st tergite, 2-4 finely, evenly, and closely punctured excepting on the posterior margins. The apical segment of the abdomen is indicated by a tube extending from the 4th segment.

There are some obscure metallic reflections on tergite 4.

Wings brownish hyaline.

♂ Resembles the ♀ but the head smaller, the antennae longer; the propodeum is more golden in coloration, reticulation of the propodeum is more regular in the middle and less complete laterally; the surface is less even and the posterior marginal carina less complete, the lateral angles less acute. The abdomen has greenish reflections on all the tergites at least laterally, the surface is less highly polished and more convex, the punctures are less definite on segments and there is more pilosity on the surface.

Five tergites can be seen, the fifth very small.

The legs have the tibiae dark with greenish reflections and the reflections on the femora are very much stronger.

One ♀ Corvallis, Oregon, Sept. 15, 1907. One ♂ Pamelia Lake, Mt. Jefferson, Oregon, July 17, 1907 (J. C. Bridwell).

NOTES AND EXHIBITIONS.

Maui insects.—Mr. Giffard exhibited a collection of insects representing six days collecting by himself and Mr. Fullaway on the island Maui.

Ascyltus penicillatus.—Mr. Pemberton exhibited a male of this large spider a pair of which he had found on vanilla in Kona, Hawaii. The female had been sent to Washington for determination.

Kelisia.—Mr. Fullaway exhibited eggs of this leafhopper in bunch grass, parasitized by a species of *Anagrus.*

Pseudococcus straussiae.—Mr. Ehrhorn stated that he had collected this mealybug at Kilauea, Hawaii, and that it was parasitized by the same species of *Anagyrus* as is obtained from it on Oahu.

Trionymus insularis.—This mealybug was reported by Mr. Ehrhorn as taken on *Deschampsia* at 29 miles, Kilauea, Hawaii.

Pipunculus sp.—Mr. Timberlake exhibited specimens of a species of Pipunculus fly, four of which were obtained by Mr. Williams in field 40, Oahu Sugar Co.'s plantation. A fifth specimen was bred by Mr. Rosa from material collected in cane

at the Experiment Station. All come near to *P. terryi* described from Kauai. Two specimens of the latter species were exhibited, collected recently by Mr. Timberlake at Grove Farm, Kauai.

Proterhinus maurus.—Mr. Swezey exhibited a specimen of this, the largest species of this genus of beetles. He also exhibited twigs of the large-leaved *Suttonia* (considered a distinct but undescribed species by Mr. Rock), collected by Mr. Bridwell May 23rd, on Mt. Olympus, showing the work of the larvae of this beetle. The adult beetle exhibited had bred out after the twigs were brought down. Mr. Swezey called to attention that in the Fauna Hawaiiensis Dr. Perkins recorded this *Proterhinus* from *Pelea,* which is an error, as the original specimens were collected from this same large-leaved species of *Suttonia.*

AEgosoma reflexum.—Mr. Swezey exhibited a larva and a pupa of this Prionid beetle taken from a dead and rotten ohia tree beside the Mt. Olympus Trail, May 23rd, 1918. There were a good many larvae of various sizes in the tree. This indicates that the species is common on this island, whereas a few years ago it was considered rare.

Nesosydne koae.—Mr. Bridwell reported the finding of this leafhopper on koa in the new planting of *Acacia koa* on Sugar Loaf, May 26th.

Cerambycid in pods of Acacia farnesiana.—Mr. Bridwell reported that on May 30th, 1918, while examining pods of *Acacia farnesiana,* recently-dead pods were found rather frequently infested by a Cerambycid. The same species was found previously in old lima bean pods, and is the one previously reported bred from dead petioles of papaya (*Carica papaia*).* The larvae are pugnacious and attack others when placed in the same box, and in no case was more than one larva found in a pod. The pods attacked were apparently those previously moth-eaten by the Tortricid *Cryptophlebia illepida.*

* Proc. Haw. Ent. Soc., III, p. 388, 1918.

JULY 11TH, 1918.

The one hundred fifty-fourth meeting of the Society was held in the usual place, President Pemberton in the chair. Other members present: Messrs. Bridwell, Ehrhorn, Fullaway, Kuhns, Rosa, Swezey, Timberlake and Willard.

Minutes of previous meeting read and approved.

The Secretary read a letter from the Trustees of the Hawaiian Sugar Planters' Association stating that $350. yearly had been appropriated by the Association toward the expenses of publication of the Proceedings.

A vote of thanks was extended to the Association.

A communication was read from the Washington Entomological Society enclosing a set of rules adopted by that Society for the guidance of the Editor in the publication of new species in the Society's publications, and asking our Society to adopt them. The matter was referred to a Committee composed of Messrs. Swezey, Bridwell and Timberlake.

PAPER.

Notes on Nesomimesa antennata (Smith) (Hymenoptera).

BY JOHN COLBURN BRIDWELL.

Mr. Williams' observations* on the habits of the Hawaiian species of this genus has confirmed the opinion some of us have held that the observations of Dr. Perkins in regard to this genus attacking craneflies were in some way exceptional or peculiar and that the real habits would be found different. Mr. Swezey had previously found the Oahu species carrying leafhoppers of the Cixiid genus *Oliarus*. On June 9, while collecting upon the Lanihuli ridge bounding Nuuanu Valley to the north-west, *Nesomimesa antennata* (Smith) was found in very large numbers flying about in the drizzly rain over the

* See pages 63-68 following. [Ed.]

staghorn ferns (*Gleichenia dichotoma*). A great majority were males but an occasional female was found and when one of them settled on a leaf the males would swarm about her but actual mating was not observed tho I do not doubt that had I taken time to watch it might have been observed. One female was seen carrying something beneath her thorax apparently between the legs of the middle and hind pairs. Upon capturing her this was found to be an adult *Oliarus,* probably *kaonohi* Kirkaldy, which is commonly found on this fern. From my previous observations of the places in which this species is found in numbers I have no doubt that the normal prey of this species is made up of the native leafhoppers as would be expected on account of the habits of Mimesids elsewhere.

Bruchidae of the Helms Collection (Coleoptera).

BY J. C. BRIDWELL.

The Bruchidae of the Helms collection of Australian insects at the Bishop Museum have been cleaned and remounted. Only three species are represented.

Bruchus semicalvus Lea. Proc. Linn. Soc. N.S.W., 33:638. 1898. Sydney, Sept. 2, Oct. (Helms).

Bruchus diversipes Lea. Proc. Linn. Soc. N S. W., 33. 640, 1898. Sydney (Carter).

Bruchus obtectus Say.
North Sydney.

NOTES AND EXHIBITIONS.

Pectinophora gossypiella.—Mr. Bridwell exhibited a specimen of the pink boll-worm bred from the native cotton, *Gossypium tomentosum.* Out of 66 bolls, two showed infestation, and only one larva matured.

Minthea rugicollis.—This rare beetle reported caught at light indoors by Mr. Bridwell.

Opius lantanae.—From a lot of lantana seeds collected in the Punchbowl district of Honolulu, Mr. Bridwell reported that more of this Braconid issued than of its host the Agromyzid seed-fly.

Microbracon pembertoni.—This parasite of the pink bollworm, Mr. Bridwell reported as having been bred from *Cryptophlebia illepida.*

Derebroscus politus.—Mr. Bridwell reported having again taken this Carabid beetle on Lanihuli Ridge.

Hydrophillid.—Mr. Bridwell exhibited specimens of a small beetle possibly a Hydrophillid found associated with ants at Waianae at sea level.

Pteromalid.—Mr. Bridwell reported having found another Pteromalid which will attack Bruchids.

Neelysia mactella.—This moth reported by Mr. Bridwell as bred from webs in moss.

Enarmonia walsinghami.—This Tortricid moth reported by Mr. Bridwell as bred from koa pods.

Cryptophlebia parasites.—Mr. Bridwell reported having bred *Pimpla hawaiiensis, Cremastus hymeniae* and *Omphale metallicus* from *Cryptophlebia* in koa pods, probably both *illepida* and *vulpes.*

Cecidomyid.—Mr. Bridwell reported breeding a Cecidomyid from the remains of the seeds of a Livistonia palm which had been destroyed by a Scolytid beetle.

Chalcolepidius erythroloma.—Mr. Swezey exhibited a specimen of this large Elaterid beetle reared from a nearly full-fed larva found in a standing dead trunk of *Maba sandwicensis* at Niu, February 10th, 1918. As there were termites and moth larvae (*Semnoprepia* sp.) present, it was taken to be predacious. It had been fed on *Adoretus* grubs, flies and ground roaches, and molted on the following dates: Feb. 20, March 17, April 22. It pupated June 11, and became adult June 26. It was about a week becoming hardened up.

Dolichurus stantoni.—This wasp which is parasitic on roaches (*Phyllodromia* spp.) was introduced from the Philippines in 1917, a few being liberated in Makiki Valley in June and October of that year. Mr. Swezey reported recently finding them in the cane fields at the Experiment Station, H. S. P. A., thus indicating that it has become established.

Epeleytes draptes.—Mr. Swezey exhibited a specimen of this bug taken by him at light in Kaimuki, June 30th. The type specimen was collected by him in an old dead bean pod (*Canavalia* sp.) of a vine growing on a stone wall at Koloa, Kauai, August 2nd, 1908. It was described by Kirkaldy in Proc. Haw. Ent. Soc., II, p. 119, 1910. Since the first capture there has been no other record of its capture till now. Mr. Timberlake reported capturing 4 specimens at light in Kaimuki, June 29th to July 8th.

Genophantis leahi.—Mr. Swezey reported having reared this Phycitid moth from *Euphorbia* n. sp. collected by Mr. Rock on Molokai, May 30, 1918. It is the first record of this moth from Molokai.

Lycaena boetica.—This butterfly was reared by Mr. Swezey from *Sesbania tomentosa* collected by Mr. Rock on Molokai, May 30, 1918.

Xiphidium varipenne.—Mr. Swezey exhibited some pods of *Acacia farnesiana* which had had the outer surface eaten off. He had observed some of the *Xiphidium* grasshoppers in the act of doing this. It was in the region lying on the slope beyond Kaimuki toward Waialae.

Java insects.—Mr. Ehrhorn exhibited a small collection of insects from Java.

Elachertus sp.—Mr. Timberlake exhibited this small Chalcid reared from *Hypothenemus* by Mr. Crawford.

Rhopolotus sp.—Mr. Timberlake exhibited a prettily marked yellowish and green species of an Entedonine, taken in grass at Lihue, Kauai, recently, which runs to this genus.

Tortricid in apricot.—Mr. Rosa exhibited a Tortricid moth recently reared from an apricot fruit from California.

AUGUST 1ST, 1918.

The one hundred fifty-fifth meeting of the Society was held in the usual place, Vice-President Timberlake in the chair. Other members present, Messrs. Bridwell, Ehrhorn, Fullaway, Mant, Osborn, Potter, Rosa, Swezey, Wilder, Willard and Williams.

Minutes of previous meeting read and approved, with corrections.

The Committee appointed at the last meeting to consider the rules adopted by the Washington Entomological Society to apply to the publication of entomological descriptions and papers, submitted its report, which is embraced in the following rules and suggestions:

Rules and Suggestions Applying to Types and Entomological Descriptions and Papers in the Publications of the Hawaiian Entomological Society.

RULE 1. No description of a new genus, or subgenus, will be published unless there is cited as a genotype a species which is established in accordance with current practice of zoological nomenclature.

RULE 2. In all cases a new genus, or subgenus, must be characterized and if it is based on an undescribed species the two must be characterized separately.

RULE 3. No description of a species, subspecies, variety or form will be published unless it is accompanied by a statement which includes the following information, where known (1) the type locality, (2) of what the type material consists —with statement of sex, full data on localities, dates, collectors, number of specimens, etc., and (3) present location of type material.

RULE 4. In the discussion of type material of insect species, the following terms shall be used in the sense as defined below:

Type series. All the specimens studied by the author at or before the time of the completion of the description and specifically mentioned in the description.

Type=holotype. One individual selected by the author to represent the species.

Allotype. One individual of the opposite sex from the type selected by the author from the type series to represent that sex.

Paratypes. The other specimens of the type series besides the type.

Cotypes. Members of the type series when no individual has been selected by the author as a type.

Lectotype. An individual selected from a cotype series subsequently to the publication of a description to take the place of a type.

Neotype, metatype, topotype. This Society disapproves of the use of these terms, or any other word containing the radical "type," except as applied to material before the author at the time of the completion of the description. If an author desires to employ any other terms with reference to type material, these should be defined in the paper in which they are used.

RULE 5. No unsigned articles, or articles signed by pseudonyms or initials, will be published.

RULE 6. The ordinal position of the group treated in any paper must be clearly given in the title or in parentheses following the title.

SUGGESTION 1. All illustrations accompanying an article should be cited in the text and preferably in places where the object illustrated is discussed. All plates should be provided

with designation of figures, if any, explanations, and citation of text pages.

SUGGESTION 2. It is desirable in describing new genera and species that their taxonomic relationship be discussed and that distinguishing characters be pointed out.

SUGGESTION 3. In all cases in the serial treatment of genera or species and where first used in general articles the authority for the species or genus should be given, and the name of the authority should not be abbreviated.

SUGGESTION 4. Where the title of any publication referred to is not written in full, standard abbreviations should be used.

SUGGESTION 5. When a species discussed has been determined by someone other than the author it is important that reference be made to the worker making the identification.

NOTES AND EXHIBITIONS.

Thecla echion.—Mr. Williams recorded the rearing of this butterfly from larvae feeding on pods and seeds of *Cordia sebestena*. The larvae pupated June 21, and the adults appeared July 5.

Nesophryne sp.—Mr. Swezey exhibited specimens of this large Jassid captured on the ridge known as Malamalama on the windward side of Mt. Konahuanui. He and Messrs. Bridwell and Timberlake collected 13 adults off *Clermontia kakeana* and 1 off *Byronia*. The known species of this genus occur only on Kauai. These are the first found on Oahu, and probably constitute two new species.

Bombycid cocoons.—Mr. Ehrhorn exhibited some very remarkable cocoons, probably of species of *Cecropia*—one from Bolivia and one from Japan.

Termites from yams.—Mr. Ehrhorn exhibited specimens of termites taken in a shipment of yams in his quarantine inspection work.

Insects from Jahore.—Mr. Mant exhibited a small collection of attractive insects from Jahore, Malay Straits—moths found in a garden, beetles from the forest, and a blue chrysidid found in a railway tie.

Insects from Barbados.—Mr. Wilder exhibited the following insects recently received from Barbados: *Diaprepes abbreviatus, Phytalus smithi,* both of which are the adults of sugar cane root grubs; *Tiphia paralella,* a parasite on the grubs of *P. smithi.*

Nesodryas perkinsi.—Mr. Timberlake exhibited a male of this Delphacid taken on *Clermontia kakeana* at Malamalama, July 28.

Nesodryas bobeae.—Mr. Timberlake exhibited a female of this Delphacid collected on Palolo Ridge, April 8th, 1917. This species has not been collected since 1905.

Diachasma tryoni.—This Braconid parasite of the Mediterranean fruitfly was reported common by Messrs. Wilder, Swezey and Fullaway, all having found it working on infested fruit in Honolulu gardens.

SEPTEMBER 5TH, 1918.

The one hundred fifty-seventh meeting of the Society was held in the usual place, Vice-President Timberlake in the chair. Other members present: Messrs. Ehrhorn, Fullaway, Giffard, Potter, Swezey and Williams. Mr. Fordyce Grinnell, Jr., was a visitor.

Minutes of previous meeting read and approved.

The Secretary was instructed to prepare copies of the rules for the preparation of descriptive papers adopted at the last meeting and distribute the same to the active members.

On the Genus Ilburnia White (Homoptera, Delphacidae).

BY F. MUIR.

(PRESENTED BY W. M. GIFFARD.)

Ilburnia White 1878, Proc. Zool. Soc., Lond. p. 471, subgenus of *Liburnia* Stal.

Nesosydne Kirkaldy 1907. Proc. Haw. Ent. Soc. I. p. 161.

In the British Museum collection there are two female specimens under the name of *Ilburnia ignobilis* White, collected by Wollaston on Diana's Peak, St. Helena. The type is in good condition but the second specimen, which is smaller and darker and represents another species, is without tegmina. The shape of the tibial spur places them among the Alohini and there is no structural difference to separate them from *Nesosydne* Kirkaldy. *Delphax simulans* Walker, collected by Darwin in the Galopagos Islands, also has to come into the same genus although it is not quite typical. This makes the present known geographical distribution for this genus, Hawaiian Islands, with many species, Galopagos Islands, with one species, and St. Helena, with two species. *I. ignobilis* White and *I. simulans* (Walker) are redescribed below.

Unfortunately the name *Nesosydne*, so well known to our local collectors, will have to give place to *Ilburnia*.

Ilburnia ignobilis White.

Head much narrower than thorax; vertex slightly longer than width of the base, apex narrower than base; length of face a little more than twice the width, slightly narrowed between the eyes, median carina simple; clypeus tricarinate; antennae long, reaching to apex of clypeus, terete, joints subequal in length, second slightly thicker than the first. Pronotum and mesonotum tricarinate, lateral carinae of pronotum diverging, straight, reaching hind margin. Tegmina not reaching to the middle of abdomen, truncate at apex. Legs long, slender, first hind tarsus longer than second and third together, spur nearly as long as first tarsus, nar-

row, cultrate, thick, convex on both surfaces, or very slightly flattened on inner surface, nine large teeth on hind margin.

Yellow or light brown, darker between carinae of head and thorax, nearly black between carinae of face, two broken, darker medio-lateral stripes down abdomen. Tegmina hyaline, yellowish, veins, concolorous with membrane, granules small, sparse, with yellow hairs.

Length 4.6 mm.; tegmen 1.7 mm.

One female from Diana's Peak, St. Helena (*Wollaston*).

The second specimen under this name from the same locality represents another species but is not in good enough condition to describe.

Ilburnia simulans (Walker).

Delphax simulans Walker, List of Hom. Insects II. p. 355 (1851).

Male. Head slightly narrower than thorax; vertex slightly longer than width at base, perceptibly narrowed to apex, carinae normal; length of face nearly double the width, narrowest between eyes, broadest slightly distad of middle, median carina simple; antennae reaching to apex of face, terete, first joint about half the length of the second; pronotum tricarinate, lateral carinae straight, diverging posteriorly, reaching hind margin, mesonotum tricarinate. Legs comparatively short, first hind tarsus sub-equal to the second and third together, spur small, about two-thirds the length of first tarsus, cultrate, thick, both surfaces convex or with the inner surface very slightly flattened, ten small teeth along the hind margin.

The form of the tibial spur places this species in *Ilburnia* of the Alohini, oherwise it would be best placed in *Kelisia*.

Head, thorax and legs light brown, carinae and antennae lighter, abdomen dark brown. Tegmina reaching half way down the abdomen, hyaline, light brown, a dark brown mark at the apex of clavus, slightly brownish over basal area of tegmen.

Length 2.2 mm.; tegmen 1.3 mm.

Two specimens from James Island, Galopagos Islands (*C. Darwin*).

Female similar to the male but the abdomen slightly lighter.

Length 2.6 mm.; tegmen 1.3 mm.

Three specimens, one from Charles Island and two from James Island. (*C. Darwin.*)

There is one specimen from James Island without an abdomen which I believe to be a male. Two nymphs from James Island, dark brown, marked with light down the middle of abdomen and on head and thorax, with two median facial carinae and the antennae are short, the first joint about as long as wide.

Notes on Collection of Hawaiian Insects on Island of Maui.

BY D. T. FULLAWAY AND W. M. GIFFARD.

Notwithstanding the very rainy weather which prevailed on the Island of Maui during last June, several short collecting trips were made on the slopes of Haleakala, the Wailuku Commons and in the western part of the Island. Altogether attempts were made to collect on five separate days. but the continuous rain, drizzle and fog on the mountain and in the valleys were such that the vegetation and collecting outfits were thoroughly saturated most of the time. Because of this, much inconvenience in collecting and losses in insects were sustained and results were less satisfactory than they might have otherwise been. During the entire period a total of twelve hours actual collecting was all that could be obtained.

The most favorable locality on this visit was Olinda, along the pipe line, at an elevation of 4200 feet. There is a fair automobile road up to within a mile of the lower end of the trail, the latter extending for some distance into an interesting forest region. The further along this trail the weather and other conditions allow one to tramp and collect the more interesting it becomes. Unfortunately the weather did not permit us to penetrate very far from our headquarters although two attempts were made. Even under the existing conditions there were collected several very interesting species of Carabids including *Baryneus sharpi, Atelothrus, Metromenus, Metrothorax* (two species) and others undeterminable, *Plagithmysus pennatus,* and *finschi, Clytarlus vestitus, Proterhinus lecontei,*

brevipennis and several other species, *Acalles humeralis, Parandrita aeneus,* and several species of *Oodemas,* among the Coleoptera; *Anomalochrysa soror,* an Aphis lion; *Odynerus camelinus, nivicola, erythrostactes, Nesoprosopis difficilis, Deinomimesa haleakalae,* among Aculeates, and one *Eupelmus,* one *Pleuroneurophion, Enicospilus molokaiensis* and *Scleroderma polynesiale,* among the Parasitica; and of Homoptera several species of Jassids and several of *Oliarus* and 4 new species of Delphacids which will be described later on. Unfortunately among the latter the males were sparse in individuals only two or more of the species having been taken in series of both sexes with nymphs. So far as it was possible all food plants of the species were recorded for convenience of others who may desire to explore this interesting region.

A day or two later a short visit was made to the new Hamakua ditch trail (Lupe) but the road to this region was almost impassable and much time was lost in getting there. The forest here is at an elevation of approximately 1200 feet and is not nearly so interesting as that near Olinda. The indigenous vegetation is much more sparsely distributed because of destruction caused by stock; and foreign weeds and grasses have crept in and are destroying much of the indigenous growth. It rained almost constantly on the day of our visit and in consequence there was not much to record from this region other than one new species of *Nesosydne* and several Jassids amongst the Homoptera and *Odynerus ecostatus, camelinus* and *instabilis* among the Aculeates.

A morning was spent on the Wailuku Commons but the indigenous vegetation on these sand hills has become very sparse due to continual pasturing of cattle and use of large portions of the locality in recent years for the growth of sugar cane and other purposes. On *Coreopsis mauiensis* a large series of what is apparently a new *Nesosydne* was taken but Aculeate Hymenoptera, particularly the low land species of *Odynerus* and *Nesoprosopis* which were formerly quite abundant in the

region, were almost absent at this time. One *Proterhinus* and four *Oronomiris hawaiiensis* were also taken.

A short visit in the direction of Lahaina was made in fine weather but here again many of the interesting lowland and coast forms of Aculeates were comparatively scarce except in the commonest of species—*Odynerus purpurifer, insulicola, smithii, rubrotinctus, Nesoprosopis facilis, Crabro mandibularis,* and one Carabid were taken. On *Ipomoea pes-caprae, I. insularis* and *I. platyphylla* a series of Delphacids (*Aloha* sp.) were taken but all these are apparently the common *A. ipomoeicola.* The extreme variations in color of this Delphacid as captured on these three species of *Ipomoea* is very marked and notwithstanding that all were taken at practically the same elevations and within a few hundred feet of each other. There is room for study as to why these extreme variations in the color exist in some of our commonest Delphacids, and the theory already advanced in Mr. Muir's notes on Hawaiian Delphacids that this variation is caused in part by the food plant appears plausible to some extent.

On the day of our return to Honolulu a short visit was made to Iao Valley, weather conditions being such as to prevent a previous tramp in that region. The trails into the valley at the time were practically impassable because of heavy rains, so that we were only able to get as far as the first crossing of the Wailuku river. At this point on a small area of *Eragrostis variabilis* a long series of both sexes and young of a new species of *Kelisia* was obtained. This is the first species of that genus of Delphacids taken on Maui so far as is known. One *Proterhinus,* several Jassids and *Odynerus ecostatus* and *purpurifer* were also taken.

Description of Paranagrus osborni n. sp. (Hymenoptera, Mymaridae).

BY D. T. FULLAWAY.

Paranagrus osborni n. sp.

♀ .6 mm. long, flavous, head smoky with some black markings, abdominal tergites, all the joints of the flagellum and the valves of the ovipositor fuscous. Very similar to *P. optabilis* but smaller in all proportions. Length of wings .48, length of valves of ovipositor .25, length of valves to the suture .18. There is a constant difference in the proportionate length of the two sections of the valves on either side of the suture. In *P. osborni* it is 1:3.4; in *P. optabilis* 1:3.

♂ pallid, markings fainter; distal antennal joints broken off.

Type locality—Los Banos, Philippine Islands. Bred from eggs of *Peregrinus maidis*, by H. T. Osborn, 1915. Type and 16 paratypes including 1 ♂ on three slides. Types in the collection of the H. S. P. A. Experiment Station, Honolulu.

NOTES AND EXHIBITIONS.

Maui insects.—Mr. Giffard exhibited four boxes of insects collected on Maui in June, and gave notes on the Delphacids in the collection, some of which were new species. He also exhibited specimens of a new species of *Kelisia* and a new species of *Ilburnia* and a number of Jassids collected on Molokai in June by Mr. J. F. Rock.*

Holochlora venosa.—Mr. Swezey exhibited a specimen of this large green Locustid or katydid, collected by Mr. Charles Atherton at Luakaha in Nuuanu Valley, where he said that they had recently appeared quite common. Mr. Timberlake reported that he had bred *Anastatus koebelei* from eggs of this katydid brought in by Mr. Rosa. The parasites had emerged six weeks after the eggs were brought in.

Oxya velox.—Mr. Swezey reported the finding of a small

* The new species of Delphacids in the collections exhibited have been worked by Mr. F. Muir. See his paper farther on in this issue.

colony of this grasshopper at Haiku, Maui, August 24th. It has been known on Oahu and Kauai since 1897, but has not previously been reported from Maui.

Scolia manilae.—Mr. Swezey reported observing a male specimen of this introduced Philippine wasp in his garden at Kaimuki, Sept. 2nd. A colony of female wasps had been liberated there several months previously, and this is the first evidence of their having become established there and breeding on the grubs of *Adoretus.* Mr. Timberlake reported having recently observed one of the wasps on the window at the Experiment Station.

Euphorbia insects on Maui.—Mr. Swezey exhibited the following insects collected by him on *Euphorbia* in Iao Valley, Maui, August 8th, 1918, in each case being the first record of these insects from Maui:

* *Dictyophorodelphax* n. sp. Different from the two species occurring on Oahu.

Jassid. Apparently closely related to an undescribed species that has been collected abundantly on *Euphorbia* on the coral plain below Ewa Mill, Oahu.

Ithamar n. sp. Apparently the same undescribed species of bug that was collected on *Euphorbia* on Niu Ridge, and at the Pali, Oahu.

Cimex lectularis.—Mr. Fullaway exhibited specimens of the bed-bug with eggs and nymphs. Six eggs were laid by one female and they hatched in seven days. The young frequently sought protection beneath the body of the mother. All were active after a week in confinement without food.

Pentarthron flavum.—Mr. Fullaway reported breeding this Trichogrammatid from the eggs of *Lycaena boetica* and *Pectinophora gossypiella.*

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* Described on page 72 following. [Ed.]

OCTOBER 3RD, 1918.

The one hundred fifty-seventh meeting of the Society was held in the usual place, Vice-President Timberlake in the chair. Other members present: Messrs. Bridwell, Crawford, Ehrhorn, Fullaway, Giffard, Langford, Rosa, Swezey and Williams.

Minutes of previous meeting read and approved with corrections.

Mr. Fordyce Grinnell, Jr., was elected to active membership.

PAPERS.

Epyris Extraneus Bridwell (Bethylidae), a Fossorial Wasp That Preys on the Larva of the Tenebrionid Beetle, Gonocephalum Seriatum (Boisduval)

BY FRANCIS X. WILLIAMS.

Epyris extraneous was first taken in the Hawaiian Islands by Swezey in October and November, 1915, on the grounds of the Experiment Station of the Hawaiian Sugar Planters' Association at Honolulu, Oahu. Subsequently he found it in 1917 on the island of Maui. It is now quite abundant on Oahu where it seems more partial to the lowlands and can be taken at all seasons of the year. Bridwell, who described this *Epyris,* (Notes on a Peregrine Bethylid, Proc. Haw. Ent. Soc. for 1916, Vol. III, No. 4, pp. 276-279, 1917), also identified specimens from Los Baños, Philippines, as belonging to this species and so it seems probable that it has a fairly wide Oriental distribution.

Very little is known about the life-history of the genus *Epyris* Bridwell (A note on an *Epyris* and its Prey, Proc. Haw. Ent. Soc. for 1916, Vol. III, No. 4, pp. 262-263, 1917) found an *Epyris* sp. near Capetown, South Africa, dragging a small tenebrionid larva between its jaws, and in the same

article speaks of H. T. Osborn, of this Station, as having found, in September, 1915, near Pearl City, Oahu, a tenebrionid larva externally parasitized by a grub, and he concludes that the latter must have been *Epyris*. During August and September, 1918, I succeeded in rearing, from egg to adult, six males and one female of *Epyris extraneus* Bridwell from the larva of *Gonocephalum seriatum*. The adult *Gonocephalum* (Fig. 1) is a stout oval, dull black beetle 8 or 9 millimeters long, very abundant at low levels, where it occurs under clods of dirt, cane trash and other rubbish. Its larva (Fig. 2) is quite slender, firm and cylindrical, of yellowish and brown or straw color and at maturity is about 17 millimeters long. It is a vigorous insect bearing a superficial resemblance to a wire-worm (Elateridae), but does not appear to be injurious, and in cane fields is probably a trash feeder. On being dug out of the ground it usually "plays possum" for a brief instant and then hastens to get under cover, burying itself with commendable speed.

The black *Epyris* wasp (Fig. 3, female) is far smaller than the larva it attacks; the female is about 6 mm. long and the male often a little smaller. The female especially, is a strongly made, lithe insect with stout jaws and legs, a good flyer and a better digger, surpassing in the latter respect the *Scolia* wasps which in habits it somewhat resembles. One *Epyris* which I enclosed from August 5th to 18th with a number of *Gonocephalum* larvae in a tumbler partly filled with earth, stung and parasitized 13 larvae. Two other wasps kept for a short time laid 2 and 3 eggs respectively. The wasps mandibles are of a rather unusual type, but well fitted for gripping, being stout and somewhat recurved at the tip. It is to be noted, however, that (under my limited observations) she selects larvae within a certain limit of size, i. e. from about 13.5 to nearly 16 mm. long; these do not appear to be in the last instar, when they are probably too powerful for her to overcome. The prey though rendered helpless is not stung to complete immobility; it is still capable of weak mouth and

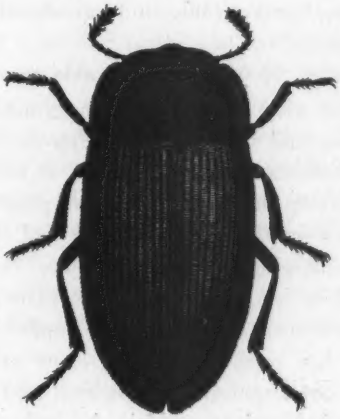


Fig. 1.
Gonocephalum seriatum.

Fig. 2.
Larva of G. seriatum with egg of Epyris extraneus on ventral surface.

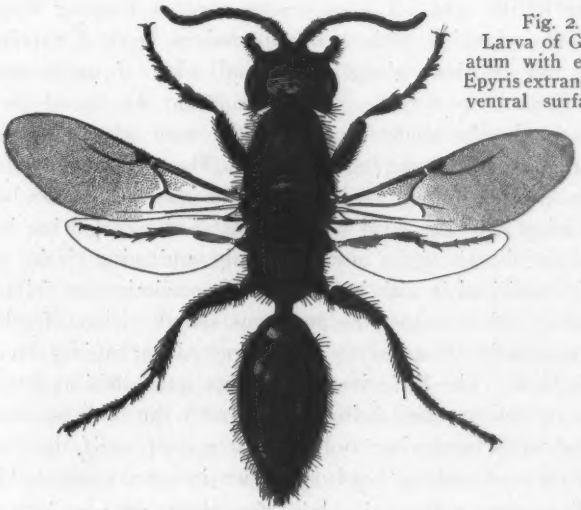


Fig. 3. Epyris extraneus.

leg movements and may also move and twitch the body a little; when seized with the forceps, however, this unusual stimulus causes it to wriggle vigorously.

On the morning of October 5, 1918, I was able to observe the field habits of this wasp on the Station grounds. The day was warm and sunny and in addition to *Epyris,* the introduced *Scolia manilae* Ashmead and *Dolichurus stantoni* (Ashmead) were also flying along the edges of an area planted to sugar cane. Male *Epyris* were the more abundant and evidently on the lookout for emerging females, but once in a while one of the latter could be seen flying low from place to place and hurriedly running beneath and among the superficial clods of earth in search of her prey. Finally I came upon one of these wasps circling about a spot and at last locating her paralyzed victim, a *Gonocephalum* larva which she had evidently wedged in between two small lumps of dirt. She seized it by the head end and, slinging it over her back, so to speak, dragged it into a hole nearby, wasp and grub entering at the same time. Later I could find nothing of wasp and prey on digging in the spot. I soon located another hunting *Epyris* and being provided with a *Gonocephalum* larva I carefully placed one of these alongside a small clod of earth under which *Epyris* was for the moment hunting; she issued therefrom very shortly almost exactly at the spot where lay her natural prey, still "playing possum". The wasp came immediately to attention, crawled carefully on the back of the larva and seizing it by the head with her mandibles curled her body around the thorax of the now vigorously squirming victim and soon immobilized it with her sting. No preliminaries followed as in many other wasps, the grub was seized without further ado apparently by a palpus and borne along rapidly on the wasp's back. The little insect was not quite half as long as her heavy booty which being carried with the back up nearly hid the wasp from view and made it appear as if the *Gonocephalum* was making headway under its own steam. After traveling thus rather aimlessly for eight or ten feet, the

Epyris, which was now quite tame, wedged her prey between loose pieces of soil, but not hiding it from view, left it to look for a nesting place; she examined several holes or ledges and finally selected a spot under a small piece of soil. During this hunt she returned once to her prey; now she seized it as before and carried it in a rather circuitous fashion towards the selected spot, but here, on account of the steep and crumbling nature of the ground, could make no headway, and so with my assistance she disappeared with her burden beneath a piece of soil. On digging in this place some minutes later I found the *Gonocephalum* an inch or more in the ground and the *Epyris* a little further in the soil. The egg had not yet been laid.

On November 15 on a sugar plantation near Honolulu I unearthed a *Gonocephalum* larva which had a small *Epyris* grub feeding upon it.

The wasp seems to form a sort of cell about its paralyzed prey and completes her work with laying a pearly white egg upon her victim. The egg (Fig. 2) is about .70 mm. long and is glued for its length along the middle of the 4th segment; it is slightly curved along the line of appression, hardly three times as long as thick, and slightly broader and blunter at the head end, which, however, points towards the posterior extremity of the body of its host. The latter lies on its back in a more or less arched position. The egg hatches in about 2 1/2 days, the larva crawling out to segment 5, commences to feed on that segment; it is successful in penetrating or drawing nourishment through the tough integument of the beetle grub, so that it soon acquires a yellowish white color. In one case I found on *Epyris* egg fixed along the side of the body at about its middle length. The grub hatched and although its host was dead, managed to feed to maturity on it. It does not seem probable that the mother *Epyris* pierces the integument of her prey at the point where she lays the egg, so as to facilitate the feeding of the issuing grub; she selects the 4th ventral segment as a place for oviposition because it protects the egg

better there than elsewhere. Presently the position of the larva is reversed, for though always feeding at segment 5 it now lies head to head with its host. It was after this change of position (Fig. 4) that I found a shrivelled exuvial cap or moult skin glued just dorsad to the end of the body. A little later on there is a second moult. At the end of three days, it is about 4 mm. long, proportionately stout and more maggot-like than in most Fossoria; clearly segmented and of a dirty yellowish white color. It is closely fixed for its ventral length to the yet living *Gonocephalum* larva by a sticky substance. The third moult takes place in probably less than a day before the larva becomes full fed. It is now armed with a much larger and stouter pair of mandibles with which it bites a good-sized hole through the fifth ventral plate of host, inserts its head and fore part of the body through this aperture, and protruding therefrom at right angles (Fig. 6) eats out the interior, first taking one end and then the other. The beetle grub succumbs at the beginning of this crude operation and when entirely eaten out is reduced to a shrivelled, transparent brownish shell. As in other fossorial wasp larvae, it is most active in the last instar; it may squirm vigorously and with the aid of a clear yellow fluid rid itself of the three shrunken moult skins, each one telescoped inside the other to form a shallow concave wrinkled disk of yellowish color. The larva becomes full fed at the end of four or five days when it is about 7 mm. long by 2.5 mm. thick below the middle, fat and glistening, with little in the way of scallops or folds; it has a relatively small head armed with stout, dark-tipped mandibles and behind the latter, long protruding mouth-parts. Its posterior extremity heretofore rather bluntly rounded is now produced into a sort of nipple. It is mainly a pretty salmon pink color, peppered with white fat-bodies, which however are lacking along the ventral line, while the extremities and lateral folds are more glassy and clearer. It is well to draw attention to the four pairs of larval mandibles, representing the four instars (Fig. 5, a—d); they are drawn to the same scale, the

Fig. 4. Epyris extraneus larva feeding on larva of G. seriatum.

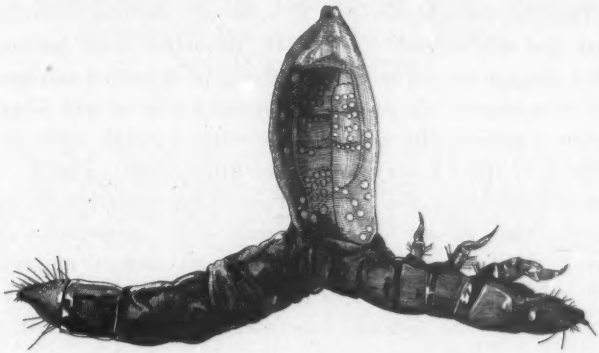


Fig. 6. Later stage of the same.

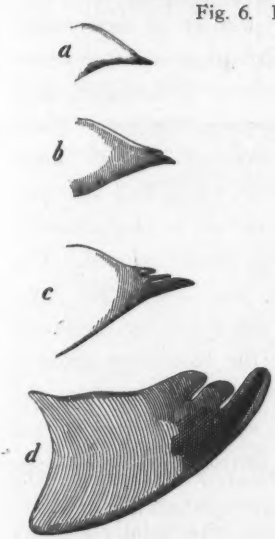


Fig. 5.
Mandibles of the successive stages of larvae of Epyris extraneus.

Fig. 8.
Pupa of E. extraneus.

Fig. 7.
Cocoon of E. extraneus.

first three pairs are not of the chewing type represented by the last pair which is utilized by the larva for coarse work, i. e. biting through the *Gonocephalum* integument and consuming by mouthfuls, the interior of the body. This morphological change in mandibles is common if not usual among carnivorous larvae of Hymenoptera.

The full-fed *Epyris* larva is now very restless, it wriggles about and works itself free of its shrivelled host, leaving it with a gaping ventral hole, and after a brief period commences to form a cocoon. It reaches about for grains of soil which it attaches together with silk, thus forming a rough outer frame in which it spins a very tough and firm cocoon (Fig. 7) that tears cleanly like tinfoil, which it somewhat resembles in being smooth and silvery white within. It measures about 9 by 3 mm. and is a little broader and blunter anteriorly; near this extremity the cocoon is partitioned off squarely from the less firm terminal subconical portion, by a neat disc, which, being rather thin along the edges, is there cut away by the emerging wasp. The upper portion is then easily pierced by the insect. The resting larva within is rather active and bears the plainly visible compound eyes of the adult, as a darker patch on the sides of second thoracic segment. There is nothing remarkable about the whitish *Epyris* pupa (Fig. 8); it much resembles the adult in shape and size and bears no or very few spines or protuberances, so characteristic of many other wasps. The ovipositor is briefly exerted. The cocoon period for August-September was about 23 days, and with 2 1/2 days for the egg stage and 4 1/2 for the larval feeding stage makes the life cycle in the laboratory about a month. Perhaps the life cycle outdoors is more brief, as the *Goncephalum* larva frequently, if not as a rule, lives buried but a few inches in loose soil which during the day is kept very warm by the sun's rays.

The adult wasp is an active flyer and superficially appears much like a *Tiphia* wasp; it may be found at flowers and at

honey-dew on bushes. It probably spends much of its time underground.

The illustrations are the work of Mr. W. R. R. Potter, artist for the Hawaiian Sugar Planters' Association Experiment Station.

Some Observations on the Leaf-Hopper Wasp, Nesomimesa Hawaiiensis Perkins, at Pahala, Hawaii, Feb. 11-April 25, 1918.

BY F. X. WILLIAMS.

This is a slender, glossy black wasp (Fig. 1) about 1/2″ (13 mm.) long frequently observed slowly flying in the more upland cane fields of the Hawaiian Agricultural Co. at Pahala. None was seen below an elevation of about 1,000 feet, and it was found to occur up to 3,500 feet; it was most plentiful, however, in Wood Valley, altitude 1,850-2,200 feet, where its adopted prey, the cane leafhopper (*Perkinsiella saccharicida* Kirkaldy) was for some months very abundant.

Fig. 1. Nesomimesa hawaiiensis.

Dr. Perkins has observed the Hawaiian Mimesidae storing their burrows with native daddy-longleg flies (Limnobiidae), but it is certain that some attack native leafhoppers as well.

Messrs. Swezey and Bridwell have observed *Nesomimesa antennata* (Smith) in the mountains of Oahu where it was catching *Oliarus,* a native leafhopper of the family Cixiidae, and Perkins in Fauna Hawaiiansis speaks of the unsuccessful efforts of *N. hawaiiensis* to catch Fulgoroid leafhoppers. In a shady gully at Pahala, I have seen both *Nesomimesa* and *Pipunculus* (a fly which parasitizes the cane leaf-hopper) searching the fronds of tree-ferns, and more than once the wasp pounced upon the moult-skins of *Siphanta acuta* Walker, a large green leafhopper, immature specimens of which as well as a smaller species of leafhopper occurred on these ferns. But where the cane leafhopper is to be obtained, both wasp and fly have transferred their attention to it in such a measure that they are often more abundant in the cane fields than in their native forest.

Nesomimesa usually hunts on the wing for her prey, but it cannot be said that she is a particularly good searcher, nor always adept at catching hoppers, and she is sometimes deceived by a cast-skin or a mouldy hopper. As a rule mature leafhoppers form her prey and what small proportion of young I have found in the cells were well grown. Not every grown hopper is suitable, for some reason many may be passed up by the wasp. Making her choice of victim she may poise a few inches before the *Perkinsiella* and make a dash at it, if successful, picking it off the cane with her jaws and legs. Or she may alight on a leaf and locating her victim nearby between leaf bases, with the aid of her wings, pounce upon it at close quarters. On several occasions I saw the wasp sting the hopper. Shortly after the latter is captured, the wasp turns it underside uppermost, and holding it thus in her middle pair of legs, doubles up her abdomen and stings it in the neighborhood of the throat. The sting is administered more than once and the act may be performed either when the wasp is resting on a leaf with her prey or hovering in the air with it.

The wasp easily flies homeward with her quieted victim,

holding it venter upwards beneath her, clasping it about the back of the neck or thorax with the end portion or tarsi of her middle pair of legs so that the spines at the tip of the tibiae are brought across the hopper's throat. Being held only by the wasp's middle pair of legs the hopper hangs obliquely under its carrier.

I noticed several *Nesomimesa* burrows in the vertical bank of a creek bed at the lower Wood Valley Station, altitude 1,850 feet. Above the rich soil was a layer of "pahoehoe" or layer lava which doubtless prevented excessive moisture from seeping through to the burrows. The latter from one to several feet above the ground in the bank, were sometimes located by the grains of soil heaped up below a burrow. Several wasps were seen examining the bank and occasionally alighting on the soil for a few minutes; but when a wasp was engaged in storing her burrow she usually strove to locate and enter it as quickly as possible. The nest-holes are cylindrical and enter the bank at a slight angle from the horizontal. The main shaft is 6-8 inches long and sometimes ends quite steeply, giving off here rather long branches, each terminating in a spacious oval cell about 15 mm. long and 8.5 in greatest

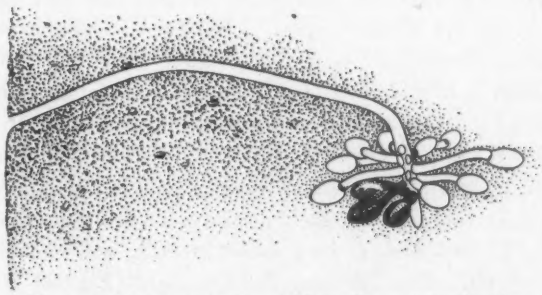


Fig. 2. Burrow and nest of Nesomimesa hawaiiensis.

diameter. These cells which may number 18 to one nest are horizontal or nearly so, and the passage to them plugged with soil up to the main burrow (Fig. 2). This seems sometimes to be done even when the cell in question is not yet completely

provisioned. Where several nests are in close proximity their respective cells cannot always be associated. One nest which I laid bare had three cells, an older one showed twelve, while a completed one had eighteen, each containing a wasp cocoon. The twelve-cell nest had 3-16 hoppers to a cell, but in some instances the cells were not yet completely provisioned, while others contained large larvae or cocoons with a few perfect hoppers and a quantity of small fragments of the provisions.

None of these or other interned hoppers showed any movement, in fact some were not in good condition, among them being mouldy specimens. But one egg is laid to a cell. The egg is glued on the underside of one of the hoppers, being secured longitudinally thereto so that its anterior or head end is near or touches the base of one of the fore legs of its host. The egg is very slightly curved, several times longer than its thickness which is nearly uniform throughout, being very little more bluntly rounded at its anterior than at the posterior extremity. It is 2.5 mm. in length and pearly white.

The larva hatches probably in about two days and devouring its store of provisions at the end of about six days more, commences to spin its cocoon. It is then about 12 mm long and spindle shaped, the head is of medium size and provided with sharp and slender jaws. The body is well segmented though the lateral folds are not plainly marked, while the whole skin is provided with very fine transparent granulations. The mid-gut is lead color, while both etxremities of the body are glassy white. The silken cocoon is rather delicate, surrounded by bits of soil and leafhopper remains, it tapers a little more at the posterior end, measures from 10 to 15.5 mm. long by 3.5 to 5 mm. at its greatest breadth, and is of a light-brown or tan color. A large female pupa (Fig. 3) is about 13 mm. long and is rather stout for so slender an insect, the waist being comparatively thick. The top of the head bears two pairs of spines and the mesonotum a pair of low tubercles. There are no lateral tubercles but the processes on the antennae and legs are knobbed. Its first color is probably pearly white.

Several cocoons which I unearthed April 6 and brought to the Experiment Station yielded adults in the first week of May.

The wasp does its share in destroying leafhoppers; while immensely less numerous than the cane pest, it is nevertheless abundant in some fields, where one female may capture 100 or more hoppers for provisioning her nest. In a twelve-celled nest 65 cane leafhoppers were counted, and as this burrow contained three cocoons and one or two other cells in which the provender had been largely consumed, it is quite safe to estimate the number of *Perkinsiella* supplied here as exceeding 100.

Fig. 3. Pupa of Nesomimesa hawaiiensis.

But while *Nesomimesa* has beneficial habits, it does not work in full harmony with the *Pipunculus* fly heretofore mentioned. Be it noted that of the 65 hoppers stored by one wasp, 15 of these were already parasitized by *Pipunculus*. This is a far higher per cent. of *Pipunculus* parasitism (23%) than existed in the adjacent cane field, from which *Nesomimesa* very probably caught her prey, (4.09%). Some of the fly maggots in the cells were alive in the hoppers, and others still, brought in through the medium of their host, were sufficiently far advanced in development as to be able to pupate. Four pipunculated hoppers secured from a wasp's nest failed to produce puparia, and though *Pipunculus* sometimes do hatch in the cells, it is doubtful if they can work their way entirely out of their earthen prison. Possibly the more sluggish behavior of *Pipunculus*-parasitized hoppers in the field permits of their being captured with greater ease and therefore frequency by the wasp than their more healthy brethren.

Although this wasp works best during the sunshine it will

industrially bring in hoppers in cloudy weather and even as I once observed, during a light rain.

During November I had occasion to visit the Wood Valley region again. The cane leafhopper had disappeared and *Nesomimesa* was pursuing her vocation higher up among the shrubbery of the native forest which flourished at an elevation of several hundreds of feet above the cane fields.

Thus it seems that this wasp which is really a forest insect, may from time to time be compelled to fall back on native leafhoppers as a sparser though more dependable source of food supply for her young than is furnished by *Perkinsiella*, the cane pest.

The figures are the work of Mr. W. R. R. Potter, illusrator for the H. S. P. A. Experiment Station.

Some Observations on Pipunculus Flies* Which Parasitize the Cane Leafhopper, at Pahala, Hawaii, Feb. 11-April 25, 1918.

BY F. X. WILLIAMS.

Fig. 1. Pipunculus sp.

This is a rather small blackish fly (Fig. 1) which like the wasp *Nesomimesa hawaiiensis*, has largely transferred its atten-

* Three species of *Pipunculus* were taken at Pahala; *P. juvator* Perkins, *P. hawaiiensis* Perkins and an undescribed species.

tions from native leafhoppers to our introduced pest, the cane leafhopper.

Pipunculus, spending a large part of its existence in flight, is provided with particularly long wings. Its eyes are so far developed as to be contiguous or "holoptic", occupying almost the entire head, while the feet are provided with pads and long claws for snatching up its prey.

Pipunculus is a more widely distributed insect than *Nesomimesa;* it was found on a number of plantations, extending from near sea level to well into the moist forests. Like the wasp, it was most abundant in the Wood Valley region, in places where the leafhopper occurred in some numbers. It is easily recognized by its hovering flight varied now and then by a jerky shift. The male is slightly the larger of the two, his wings are a trifle darker and his flight a little different from that of the female, for where the latter closely scrutinizes cane stems, leaves, weeds, or ground, searching for her prey, the male flies somewhat more hurriedly and does not peer so into retreats, etc., and thus covers more ground. Both sexes are often seen on cane leaves, feeding on dew or honeydew. The male carries his mate about and both are often thus taken on the wing.

On numerous occasions I have seen *Pipunculus* capture her prey and sometimes several of these huntresses could so be seen at one time. One is not always impressed with the fly's selection of hunting grounds, and like *Nesomimesa,* she is sometimes deceived, though only for the moment, into snatching at leafhopper moult-skins. The victims selected are very small to perhaps a little less than half-grown leafhoppers. A suitable one being discovered by the hovering fly is suddenly pounced upon and snatched up in the air. The captive is sometimes dropped almost immediately as if unsuitable, others, however, are held in mid-air for from one to several seconds; the fly usually rising a little with her burden which would be dropped on a leaf or on the ground. Often immediately thereafter, *Pipunculus* would hunt out another hopper, showing that

she must have several eggs ready for laying. While in the air with her victim, her abdomen could be seen curved towards it; she is provided with a sharp corneous ovipositor, with which she either pierces the hopper's body or inserts her very small egg (not seen) under a body fold. At any rate the liberated homopteron seems unhurt and usually hops away. If the young hopper is too large, the fly is sometimes apprised of the fact by being hurled back by the insect's vigorous leap.

In catching recently pipunculated hoppers, I found it best to sit down before a sort of clearing among cane plants, shake down a number of hoppers and place leaves bearing many young, in suitable positions and with a white cloth or handkerchief held beneath her, carefully but quickly follow a burdened *Pipunculus*. As soon as the hopper is liberated, it falls on the cloth and a wide-mouthed vial is clapped over it. I was unsuccessful in many attempts but managed thus to secure 6-7 parasitized hoppers in about an hour.

The life of the young *Pipunculus* is rather long, inasmuch as it is not ready to leave its host's body until some time after the latter has become mature. Then a male hopper thus parasitized develops a much swollen abdomen, but I was not able for certainty to distinguish similarly affected females. The latter often have the body normally swollen with eggs, but when pipunculated, these eggs are consumed by the growing parasite. In its early stages, the maggot is rather soft and delicate, in later development it is decidedly tough; then it is tinged with orange, is wrinkled and active and short-oblong in shape.

On April 12th, I captured a few small hoppers which had been caught up and dropped by *Pipunculus*. Some of these were successfully transported to the Experiment Station in Honolulu, where five of them matured in the first part of May. By May 14th one male was seen to have a swollen abdomen and thus to be certainly parasitized, but unfortunately it died shortly thereafter. The last of these hoppers to die, a short-winged female, did so on May 20th, and her abdomen

contained an almost mature *Pipunculus* grub. Thus we may estimate the egg and larval stage of the fly, at the commencement of the warm season as approximately forty days.

The mature grub makes its way out of the hopper's body, thus killing the already sluggish insect, and after some hours forms a very stout, dark-brown puparium. In the cane fields these puparia were not infrequently found at the base of cane leaves or elsewhere on the leaf. The pupal stage at Pahala, 800 feet, for February-March was found to be 28 days in one case and 34 in another.

At first it appeared that the male hoppers were the more often parasitized by the fly; I believe, however, that this was because the parasitism was more easily recognized in that sex. Affected hoppers were very frequently captured by the *Nesomimesa* wasp and this seemed to apply particularly to males, as can be seen from the following table for April 4th. One wasp nest contained hoppers as follows:

Males	28	Females	34
Parasitized	14	Parasitized	1

All hoppers here were carefully examined.

The following are percentages of leafhopper parasitization by *Pipunculus*. They are probably underestimated owing to the difficulty of distinguishing small *Pipunculus* maggots.

			Feet Elevation	Leafhoppers Collected	Parasitized	%
Pahala	3/11	Upper Moaula (Field No. 1)	2300	35	4	11.4
"	4/1	Wood Valley Homesteads	2150	196	7	3.57
"	4/3	Wood Valley Homesteads	2150	104	6	5.77
"	4/4	Wood Valley Variety Sta.	1850	63	15	†23.
"	4/6	Wood Valley Variety Sta.	1850	99	4	*4.04
"	4/10	Middle Mud Flow (Field No. 40)	1900	178	4	2.24
	4/22	Mill Field (Field No. 14)	750	82	11	13.4
Olaa	3/15	Mountain View (Field 6)	1500	333	12	3.6
"	3/15	Mountain View (Field 6)	1500	215	10	4.63

† Hoppers taken out of nest of *Nesomimesa* wasp.
* Many hoppers died.

Dictyophorodelphax praedicta sp. nov. (Homoptera, Delphacidae)

BY JOHN COLBURN BRIDWELL.

Length 5.6-6.4 mm.; length of prolongation of head in front of eyes 2.5-2.8; length of tegmen 1.3-1.6.

Very much like *D. mirabilis* Swezey but darker. The prolongation of the head is shorter, only about the length of the body and the apical depressed portion is much shorter and compressed, the space between the dorsal carinae being acuminate at apex. Lateral carinae confluent at about two-thirds of their length from the base.

The tegmina are shorter than in the other species, the four apical segments of the abdomen being visible beyond them instead of through, as in the case of the other two species. The black dots along the veins are much reduced in comparison with the other species.

The nymphs closely resemble those of *D. swezeyi* Bridwell but the prolongation of the head is slightly deflexed instead of straight.

♂ The genital styles are more elongate than those of *D. swezeyi* and only gently curved, the slender points not being clawlike as are those of *D. mirabilis*. The extreme apices are slightly blunt and recurved.

Fig. 1. Dictyophorodelphax praedicta, edeagus (highly enlarged).

The edeagus has the slender apical portion nearly in a straight line with the not greatly stouter basal portion. The ventral surface of the slender apical portion is covered with many small reflexed teeth and there are two groups of stouter

The figure is the work of Mr. W. R. R. Potter, illustrator for the H. S. P. A. Experiment Station.

teeth on the dorsal surface, one basal and the other at the origin of the apical processes. At about two-thirds the distance from the base, the apical slender portion is divided into two apical processes, of which the ventral is stouter and only about two-thirds the length of the dorsal and is dorsally curved. The dorsal process is ventrally curved and somewhat strap-shaped.

In *D. swezeyi* the dorsal teeth are in a single group at the base of the slender portion while the ventral teeth are larger and the teeth are much the same in *D. mirabilis.*

Described from 13 ♀ ♀, 9 ♂ ♂ and one nymph, August 8, 1918 (O. H. Swezey) 21 ♀ ♀, 10 ♂ ♂ and 5 nymphs, Aug. 13 and Sept. 8, 1918 (J. C. Bridwell), collected on *Euphorbia hookeri integrifolia* in Iao Valley, Maui, Hawaiian Islands, at elevations of 600-800 feet on the lower slopes of the ridges rising out of the valley.

Type ♂ and allotype ♀, nymphs and paratypes deposited in the collection of the Hawaiian Entomological Society. Paratypes in the collections of the Hawaiian Sugar Planters' Association, the Bernice Pauahi Bishop Museum, and in the private collections of J. C. Bridwell, O. H. Swezey, and P. H. Timberlake.

My thanks are due to Mr. Frederick Muir for the preparation of the drawing of the edeagus accompanying and to Mr. P. H. Timberlake for the dissections upon which the descriptions of this species and *D. swezeyi* were based.

NOTES AND EXHIBITIONS.

Maui Delphacids.—Mr. Giffard exhibited 6 species of Delphacidae collected on Maui in August by Mr. J. F. Rock, viz.:

From Mt. Eeke, 5,000 feet elevation, West Maui:
1 specimen *Nesorestias* n. sp., or *Ilburnia* n. sp.
If the latter, probably a variety of *I. fullawayi.*

Small series of *Ilburnia fullawayi* var. All off *Argyroxiphium* sp.

From Waikamoi, East Maui, approximately 4,000 feet elevation:

Large series of *Ilburnia* sp. off *Gunnera petaloidea.*

Large series of *Ilburnia* sp. off *Pipturus.*

Small series of *Ilburnia* sp. off *Cyanea aculeatiflora.*

Small series of *Ilburnia* sp. close to *I. blackburni,* off *Cyanea hammatiflora.*

Both sexes and nymphs were represented.

Hawaii Delphacids.—Mr. Giffard exhibited a collection of Delphacidae collected by himself on the Island of Hawaii during the months of July and August. With the exception of a few hours collecting in a remote district, the whole collection was taken within a radius of 5 or 6 miles from his residence in Olaa near the Volcano Kilauea. The exhibit included the following:

Series of all the 3 known species of *Nesodryas* from that Island, with the addition of a small series of one new species from *Antidesma platyphyllum.*

A large series of *Nesodryas munroi* from *Dodonea viscosa* var. *spathulata,* which hitherto has only been taken sparsely on the Island of Lanai on the same food-plant.

Of the species of the *Leialoha* and *Aloha* groups, all were collected with a view to sorting out variations in color. A small series of one new species of *Aloha*(?) taken on the sand desert at the Volcano off the common fern, *Nephrolepis exaltata,* will make the fourth of the genus so far taken on the Island of Hawaii.

The genus *Ilburnia* was also well represented by all the species with the exception of one species from Kona (which place was not visited) and two other old species which have not as yet been verified by the capture of males. The common species of this large genus were taken on this occasion

because of variations in color or because of these being attached in numbers to food-plants so far not recorded.

Of the genus *Ilburnia,* the collection also included 3 new species in series of both sexes, viz.:

One species off *Coprosma ernodeoides,* taken in Olaa.

One species off *Smilax sandwicensis,* taken in Olaa.

One species off *Lipochaeta subcordata,* taken in the a-a flows at Kahuku, Kau.

Samoan insects.—Mr. Giffard exhibited a second consignment of insects received from Dr. H. C. Kellers, U. S. N., collected at various elevations on the Island of Tutuila of the Samoan group. Of particular interest was the large series of a number of species of Fulgoridae and Jassidae.

Ilburnia koae.—Mr. Swezey exhibited a series of this Delphacid collected on koa at Kaiwiki, Hawaii, some of which had shorter tegmina than usual and lacked wings. This form was thought not to have been previously recorded.

Insects from Kaiwiki, Hawaii.—Mr. Swezey exhibited a miscellaneous collection of insects made on a one-day trip to Kaiwiki, Hawaii, in the forest about 9 miles above Hilo. There were 260 specimens, representing about 75 species.

Trypoxylon sp.—Mr. Swezey reported the capture in Hilo of the small undetermined *Trypoxylon* common in Honolulu. This species had not been previously reported from Hawaii. However, when brought to the attention of Brother Matthias Newell, he said he had known of its presence in Hilo for several years but had not recognized it as being distinct from the larger species *T. bicolor.*

Nesodryas eugeniae.—Mr. Timberlake exhibited specimens of this Delphacid taken on *Straussia kaduana,* which constitutes a new host for the species. It was taken on it at different times during the past month.

Nesodryas n. sp.—Mr. Timberlake exhibited specimens of a new species of *Nesodryas* taken on *Kadua.*

Oechalia.—Mr. Bridwell presented notes on this genus of

bugs of which he considered there were five distinct species or sub-species from the different Islands.

Calandra remota.—Mr. Bridwell reported that this Curculionid which he has found in banana stumps at several different places in the mountains and foot hills back of Honolulu, he has recently distinguished in the Experiment Station, H. S. P. A. collections, collected by Mr. Muir in China, Malay Peninsula, Java, Borneo and Amboina. This demonstrated it to be an immigrant in Hawaii.

Alphitobius diaperinus.—Mr. Bridwell reported finding this Tenebrionid beetle in a bag of spoiled mixed feed at Haiku, Maui.

Rhyncogonus lahainae.—Mr. Bridwell exhibited a Curculionid beetle captured by him on Maui, which agrees fairly well with the description of this species.

Maui Delphacids.—Mr. Bridwell exhibited 11 species of Delphacidae recently collected on Maui. They will be worked up by Mr. Muir in a forthcoming paper along with other Maui material.

Jassids from Maui.—Mr. Bridwell exhibited 6 species of Jassidae collected on Maui: 3 species in Iao Valley on *Euphorbia, Pipturus,* and *Dodonea viscosa* respectively; 3 species on Haleakala at 6,000 feet, one on *Dodonea* and two on *Eragrostis atropioides* respectively.

Capsid resembling Reduviolus.—Mr. Bridwell exhibited a peculiar Capsid bug resembling *Reduviolus* captured by him on a grass (*Deyeuxia*) at the summit of Haleakala, Maui.

Proterhinus sp.—Mr. Bridwell reported capturing a peculiar species of *Proterhinus* in dead wood of *Cyrtandra* in the mountains back of Tantalus. The species has long spinous setae and is evidently an undescribed form, but the specimen unfortunately is defective, having lost its head. The species differs from *P. blackburni* Sharp in having the subsutural ridges produced forward in front of the anterior margin of the elytra much as in *P. deinops* Perkins, which is otherwise very different.

NOVEMBER 7TH, 1918.

The one hundred fifty-eighth meeting of the Society was held in the usual place. Members present: Messrs. Bridwell, Ehrhorn, Giffard, Mant, Muir, Rosa, Swezey and Timberlake. As none of the officers were present at the opening hour, Mr. Giffard was chosen as chairman of the meeting, and he appointed Mr. Swezey as secretary.

Minutes of previous meeting were read and approved with corrections.

PAPER.

Studies in Rhynchophora (Coleoptera). V. The Genus Rhyncogonus.

BY DR. DAVID SHARP.

(PRESENTED BY MR. F. MUIR)

Rhyncogonus Sharp, 1885.
Tr. Dublin Soc., Ser. 2, Vol. III, p. 176.

When I established this genus, I indicated its relations to *Celeuthetes* and *Elytrurus*. These two genera are placed by Lacordaire in the division Celeuthetides, and it would therefore appear that I was of opinion that *Rhyncogonus* is a Celeuthetid, though I specially pointed out its similarity to *Otiorhynchus*, which Lacordaire considers to be a member of a group of general (*Otiorhynchides vrais*) distinct from Celeuthetides. In order to settle the position of this interesting and important division of the Hawaiian fauna, I have reinvestigated the question, with the result of finding that *Rhyncogonus* has characters so peculiar that it should form a separate group of Otiorhynchidae that may be called *Rhyncogonides* triba nov. The chief character of the group consists in the form of the buccal cavity; this is not filled externally by the mentum, so that the maxillae are visible for all their length, while the maxillary cleft extends backwards beyond the junction of the

mentum with the head-surface so that a short gular peduncle exits. This is a great peculiarity in the Otiorhynchidae, where it is the rule that the maxillae are quite or nearly covered by the mentum, this point of structure being in fact that on which Lacordaire founded his Legion Adelognathi, so that the condition we find in *Rhyncogonus* would suggest its removal from the Otiorhynchidae, and that it should find a place in the Phanerognathi, among the host of forms of which legion there is so far as I know nothing at all allied to *Rhyncogonus*.

The Phanerognathous condition of the mouth is most completely displayed by *Rhyncogonus koebelei*, but it exists in all the other species of *Rhyncogonus* I have been able to see, though to a less conspicuous extent.

Some of the Celeuthetides have the mouth not completely Adelognathus (e. g. *Elytrurus*), and it is probably to these that *Rhyncogonus* is nearest, but the Celeuthetides have also the corbels more or less modified whereas they are quite simple in the Hawaiian genus. The Celeuthetides are specially characteristic of the Polynesian area, and we shall not be far wrong I believe if we consider that *Rhyncogonus* is a Celeuthetid form, with more simple (or primitive) conditions of the mouth and tibiae.

NOTES ON SOME SPECIES AND THE MALE CHARACTERS.

The material for an exhaustive study of *Rhyncogonus* is at present far too small for any attempt at a revision—much less a monograph—of the genus, but I hope the following notes based on some specimens from the collections of Dr. Perkins and Mr. Giffard may prove useful.

Rhyncogonus blackburni Sharp.

This species as it stands at present is very variable, and it is possible that there may be more than one standing under the name. I have examined to a slight extent the male genitalia of a few specimens, and I find differences among them, but so slight that importance cannot be attached to them unless

the slight distinctions should be found of importance when a good examination of a number of examples is made. Figure 1 shows the male structure fairly well of an example from Tantalus, Oahu (1500 ft.) with the sac extended. In other specimens the shape of the membranous part of the sac is a little different, and the shape of the apical portion of the median lobe itself is not quite the same.

Rhyncogonus sp. (?)

In the Giffard collection there is one specimen that appears to be a new species. It is a male, found in dead leaves at Helemano, Oahu. It is scarcely 6 mm. and has somewhat the appearance of a minute *blackburni* with flat shining elytra, white hair extending all the length of the side of the thorax. The male organ has been examined; the apical portion of the median lobe is unusually short and broad. This specimen has been labelled by me as R. 18.

Rhyncogonus koebelei Perkins.

This was described from a single male eaxmple, but was subsequently reported by Dr Perkins as being plentiful in the Manoa Valley on Oahu. The species is the most remarkable of the genus, the maxillae being completely exposed, and the eyes not prominent. There is a small series from Palolo Valley, Oahu, in the Giffard collection, including both sexes. In the male the median lobe has the apical portion much prolonged and the tip curved upwards. The sac appears to be almost cylindrical, and the large transfer apparatus to be so placed as to continue the axis of the sac, but only one specimen has been seen and confirmation is desirable.

Rhyncogonus sp. n. (?)

In the Giffard collection there are two males of a form very closely allied to *koebelei,* but with obsolete sculpture on the thorax, the elytra a little differently shaped, being rather shorter, more convex and with indistinct lateral margin. The buccal cavity and the eyes are quite as remarkable as they are

in *koebelei*. The apical portion of the median lobe of the aedeagus (Fig. 3) is not so prolonged, and this would seem to point to a really distinct species. Waimano Mountains. Labelled R. 6.

Rhyncogonus sordidus Perkins.

I refer a small series of specimens in the Giffard collection from the Island of Lanai to this species, and with much doubt two from Oahu. In the specimens examined from Lanai the apical portion of the median lobe is broad, comparatively short, and with very slightly curved upwards tip. I think the Oahu form has a still shorter apex of the median lobe, and a better series might show it to be distinct.

Rhyncogonus sp. n. (?) near R. stygius.

Three specimens (1 male, 2 females) from *Freycinetia*, Wahiawa, Oahu, are probably yet another new species. It is a large form, perhaps a little smaller than *blackburni*, with rostrum rather longer, and the snout less dilated, the eyes less prominent. The aedeagus of a specimen labelled R. 4 suggests a close relationship with *blackburni*.

My examination of the male organs, inadequate as it is, shows that the male copulatory apparatus is of a simple nature, very common in Otiorhynchidae, and that different species in this genus exhibit only slight distinctions. In fact this seems to support the theory that all the species may have arisen in the Islands from a single species. A careful examination of numerous specimens with a view to ascertaining the constancy or variation of this organ is eminently desirable.

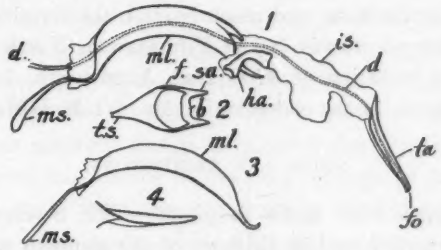
In his review of the genus in the Introduction to the Fauna Hawaiiensis, Dr. Perkins enumerated 24 species of *Rhyncogonus*, and mentions that none is known to occur on Hawaii. Mr. Giffard has, however, found a species there, of which description follows:

Rhyncogonus giffardi sp. n.

Fusco-niger, parce griseo-squamous, antennarum funiculo tibiusque subflavescentibus, elytris convexis ad latera minus discrete carinatis; oculis mediocriter convexis. Long. inc. rostr. 8 mm.

Hab. Insula Hawaii.

The only specimen is in bad condition, but is certainly a distinct species, and as the genus has been hitherto unrepresented in the Island of Hawaii, it is well to name this species, and it is due to its discoverer, W. M. Giffard, that his name should be associated with it.



EXPLANATION OF FIGURES.

Fig. 1. Median lobe, *Rhyncogonus blackburni,* internal sac extended.

Fig. 2. Tegmen, *R. blackburni,* dissected off the median lobe, which it encircles.

Fig. 3. Median lobe of *R. koebelei,* sac not extended.

Fig. 4. Transfer-apparatus of *Rhyncogonus* sp. near *koebelei.*

Lettering is uniformly as follows:—b. bridge of tegmen; d. duct; f. fork of tegmen; f. o. functional orifice; h. a. hinge-apparatus; i. s. internal sac (usually quite hidden); s. a. superior appendage of tegmen; t. a. transfer apparatus; t. s. tegminal strut.

In facies intermediate between *R. vestitus* and *R. simplex,* and may be placed near the latter, from which it is distinguished by the denser pubescense and by the elytra markedly acuminate at the apices. Eyes about as convex as in *simplex.* Thorax densely punctate with a smooth space along the middle near the front, the pallid pubescense forming a rather large patch at the sides behind, elsewhere scanty. Elytra with more

pubescense, forming irregular patches, which however allow the sculpture to be seen. It consists of series of moderately large punctures. Underside rather strongly punctured at the base of the abdomen. The mentum allows the maxillae to be seen at its sides but only slightly.

The specimen is a male, with the abdomen rather deeply impressed at the base, and much hair on the terminal segment. It was taken on *Acacia koa* at Puuwaawaa, North Kona, Hawaii, at an elevation of 3700 feet, August 8th, 1917.

The type is in the collection of Mr. W. M. Giffard.

NOTES AND EXHIBITIONS.

Cryptorhynchine beetle in ginger.—Mr. Swezey exhibited an adult weevil found in rhizones of the common white ginger (*Hedychium coronarium*) at the grounds of George Sherman, Nuuanu, November 4th, 1918. It was apparently a beetle that had not been noticed before. A small patch of the plant was being killed out. Several larvae and pupae and two beetles were found among the much-eaten rhizomes.

After some discussion, a motion carried that in co-operation with the Board of Agriculture an attempt be made at tracing the distribution of the pest and employing means of eradicating it. As a Committee for this purpose Messrs Ehrhorn and Swezey were appointed.

Cerambycid beetle.—Mr. Bridwell exhibited a specimen of the same Cerambycid beetle which was reported by him at the July, 1917, meeting as having reared from dead papaia leaf stems, and at the June, 1918, meeting from pods of *Acacia farnesiana*. The species has not been determined yet, but it was collected by Mr. Williams in the Philippines, where it was the prey of certain wasps whose habits he was observing. Hence, it is to be considered an immigrant from the Philippines.

Considerable discussion followed in regard to methods by

which immigrant insects may arrive in spite of present efficient quarantine methods.

Mr. Giffard related the manner in which certain termites reached Honolulu in army bed cots from the Philippines after the Spanish-American War, became established at the waterfront and have spread to other parts.

Mr. Ehrhorn related the intercepting of termites in a shipment of banana plants and yams from the Philippines. They were in great quantities in the shipping boxes, and were promptly incinerated in the plant quarantine laboratory.

Mr. Muir reported that it is believed the rhinoceros beetle was introduced into Samoa in the sleeping mats of immigrants from India, as it had been found under such circumstances.

Jassid on Amaranth.—Mr. Ehrhorn exhibited specimens of a small green Jassid collected by him recently on the weed, *Amarantus spinosus,* near his office at the waterfront. It was apparently a different species from the other similar Jassids occurring on grasses here, and probably is a new immigrant.

DECEMBER 12TH, 1918.

The one hundred fifty-ninth meeting of the Society was held in the usual place, Vice-President Timberlake in the chair. Other members present: Messrs. Bridwell, Crawford, Ehrhorn, Fullaway, Giffard, Grinnell, Muir, Potter, Rosa, Swezey and Williams.

Minutes of previous meeting read, corrected and approved.

In behalf of the Committee to investigate the ginger weevil, Mr. Swezey reported that all the infested plants at Mr. Sherman's residence had been dug up and burned. Later, the weevil was found in a patch of ginger on the Tantalus Trail, near the Schaefer residence, but other patches of ginger at higher elevations on Tantalus and in Nuuanu Valley were found uninfested. He had reared adult specimens from larvae previously brought in. Mr. Ehrhorn reported that an examination of the records of quarantine inspection disclosed no record

of infested ginger; that the market contained no infested ginger so far as he had found; and that other kinds of ginger than *Hedychium coronarium* including the red ginger of Fiji, another species with cone-shaped flowers and still another low form, probably a native species, were examined and no trace of infestation found. After some discussion, it was voted that the report be accepted in course and in view of the prevailing opinion that the pest might be eradicated if prompt and vigorous action were taken, the Secretary was instructed to address the Superintendent of Forestry asking the coöperation of the Board of Agriculture and Forestry to this end, stating at the same time that whatever assistance could be rendered by individual members of the Entomological Society would be gladly given.

Messrs. Swezey and Fullaway were appointed a committee to prepare a memorial for Mr. H. O. Marsh, a former member whose death had recently been noted.

PAPERS.

New Hawaiian Delphacidae (Homoptera).

BY F. MUIR.

The list of Hawaiian Delphacidae has been considerably increased during 1918. This is chiefly due to the activities of Messrs. Bridwell, Fullaway, Giffard, Rock and Swezey. In the present paper eighteen new species, one new sub-species and two new varieties are described, but a considerable portion of the collected material has not yet been worked, chiefly consisting of a collection made by Mr. W. M. Giffard in Hawaii. This latter material contains several new species. An extension of localities has been noted for several species, and the food plants of most of the new species and of some of the old ones are recorded. The taking of *Nesodryas laka* (Kirk.) and *Ilburnia monticola* (Kirk.) is of interest as no specimens of

these two species existed in the collections in the Territory. The finding of more specimens of *I. osborni* (Muir) shows that the aedeagus of the single specimen from which the species was described was damaged. The *cyathodes* group shows some interesting features for here we have certain chrootic changes, which in other groups of Delphacidae are of generic value, while the genitalia remain practically unchanged.

All the new species show as great a phallic differentiation as the old. In this question of phallic differentiation lies the chief problem of the evolution of the Delphacidae, especially of the evolution of species. Work done by Mr. Giffard on North American Delphacidae shows the same diversity of the genitalia as I have found among the Hawaiian and Oriental species.

Mr. Timberlake made dissections and mounts of his own material and that of Mr. Bridwell, and Mr. Giffard prepared mounts and drawings of the material collected by himself, and Messrs. Fullaway and Rock, so that to a large extent I am only the recorder of these new species.

The types are all deposited in the collection of the Hawaiian Sugar Planters' Association, Honolulu. Measurements are from the apex of vertex to the anus and from the base to apex of one tegmen.

The generic name *Ilburnia* has been used in place of the better known *Nesosydne*, but the change is unavoidable.

Kelisia Fieb.

Kelisia eragrosticola, n. sp. Pl. IV, f. 2.

Male. Brachypterous; length 2.6 mm.; tegmen 1 mm. Vertex slightly longer than the width at base, apex slightly conically produced, narrower than base, sides straight, converging towards apex, the Y carina obscure, the diamond-shape cell not reaching the apex; length of face about twice the width, widest about the middle, median carina simple; antennae reaching about the middle of clypeus, first joint half the length of the second. Pronotum about as long as vertex, lateral carinae straight and slightly diverging to near hind margin, then slightly converging and reaching the hind margin. Tegmina not reaching to the middle of abdomen. Hind tibiae longer than tarsi, first tarsus subequal to the other

two together. Spur slightly shorter than the first tarsus with many small teeth on the hind margin.

Opening of pygofer large, deeply emarginate on ventral edge, less deeply on dorsal edge, and segment fitting into dorsal emargination, short, each ventral corner produced into an apically truncate spine; genital styles strongly curved, slightly flattened, broadest on basal half, apex bluntly pointed, aedeagus subcylindrical, flattened and curved on apical half, apex rounded, orifice on outer side of the curve near apex, a row of small teeth along the apical half continuing along the right side, the teeth on the dorsal aspect near the middle forming a small comb, on the ventral aspect near the end of the row of teeth are some teeth forming a small, irregular comb curving to the left side.

Pale orange yellow, pale or whitish over the carinae of pro- and mesonotum and continued as three marks down the dorsum of abdomen with an outer light line on pleura of abdomen, carinae of vertex and face light, between carinae more or less fuscous, darkest along the carinae, two irregular, longitudinal dark marks down antennae, two longitudinal brown marks on femora and tibiae, genital styles, ventral portion of anal segment and middle of diaphragm brown. Tegmina pale orange yellow, veins slightly lighter than membrane, granules very obscure, a few small, black hairs, a small black mark on hind margin at apex of clavus.

Female. Brachypterous; length 3.1 mm.; tegmen 1 mm. Similar in color to the male.

Macropterous; length 3.3 mm.; tegmen 3.3 mm. Apical veins brownish and a dark mark on the hind margin at apex of clavus; wings with brown veins.

Habitat. Iao Valley, Maui. (*Giffard* and *Fullaway,* May, 1918) on *Eragrostis variabilis.* One male from the same locality and food plant (*Bridwell,* August 1918).

Described from forty-seven males, fifty females and a few nymphs. The nymphs show the three longitudinal pale marks very distinctly and are inclined to be slightly darker than the adults.

The genitalia of this species are of interest as they show the transmission from *K. swezeyi* and *K. sporobolicola* to *K. emoloa.*

K. sporobolicola Kirk. Pl. IV, Fig. 13.

Previously I figured the left side of the aedeagus of this species* but as the chief row of spines are on the right side I

* Proc. Haw. Ent. Soc., III:4, Pl. V, f. 21 (1917).

now figure that aspect. A long series from Puu Nianiau, Haleakala, Maui, about 7000 feet elevation (*J. C. Bridwell,* August 1918) on *Eragrostis atropioides.* One of these is a macropterous female. In general color they are darker than the average Oahu specimens.

Leialoha Kirk.

Leialoha lehuae mauiensis, n. var.

In coloration this is near to *L. lehuae hawaiiensis* and it varies in the same manner. The aedeagus is closely related to it as well, but has no small spine at the apex but one near the apex of the crook.

Habitat. Olinda, Maui, 4200 feet elevation (*Giffard* and *Fullaway,* May 1918) on *Coprosma montana.* Four males, three females and thirteen nymphs. This is the first *Leialoha* taken on Maui.

Nesodryas Kirk.

Nesodryas fletus (Kirk.)

One female from Lupe ditch, Maui (*Giffard* and *Fullaway,* May 1918) on *Antidesma platyphyllum.* The marks on the face are darker and more distinct than usual.

Nesodryas (Nesothoe) laka (Kirk.)

One male, three females and two nymphs from ridge south of Iao Valley, Maui, 800 feet elevation (*Bridwell,* August 1918) on *Sida.* These conform fairly well to Kirkaldy's description which was made from one female, and are the only specimens taken since the type.

N. (Nesothoe) munroi Muir.

Nineteen males, thirty females and nymphs on *Dodonea viscosa* var. *spathulata,* A-a flows, Kau, Hawaii, 3600 feet elevation (*Giffard,* July 1918).

N. (Nesothoe) gulicki Muir.

Twelve specimens on *Euphorbia* sp., Nuuanu Pali (*Giffard* and *Muir,* December 1918).

The figure of the aedeagus of this species* is not very good. The orifice is at the apex, from the left edge of the orifice arises a small spine, a little basad and slightly more ventrad is a larger spine expanded at the apex with some small projections on the expanded portion, basad of this and on the right side there is a small spine curved distad and with a minute spine about the middle.

A long series from middle Puna, Hawaii, 750 feet elevation, on *Metrosideros collina polymorpha* var. *glaberrima*. Several specimens in this series are very light in color, especially some of the females in which most of the color on the tegmina is faded out. Also three specimens from 23 miles, Olaa, Hawaii. (*Giffard*, August 1918).

Aloha Kirk.

Aloha ipomoeae Kirk.

A long series from the sea shore at Olowalu, Maui, some off of *Ipomoea pes-caprae* which are all light in color, and others on *Ipomoea pentaphyllum* which are all much darker in color. Three adults on *Ipomoea insularis* from Iao Valley, Maui, also belong to the dark variety (*Giffard* and *Fullaway*, May 1918).

Two males, five females and young on *Sesbania tomentosa* and one male and eight female on *Ipomoea pes-caprae*, from Momomi, Molokai (*Rock*, June 1918). These are all light forms.

Ilburnia White.

I. pseudorubescens (Muir.)

Two male specimens from Olinda, Maui, 4200 feet elevation, one taken on *Lobelia* sp. and the other on *Acacia koa*, which I consider to be this species (*Giffard* and *Fullaway*, May 1918).

I. tetramalopii n. sp. Pl. III, f. 7, Pl. IV, f. 19.

Male. Brachypterous; length 1.6 mm.; tegmen 1.3 mm. Length of vertex nearly double the width, apex subconical, sides subparallel to near

* Proc. Haw. Ent. Soc., III (1916), Pl. 2, fig. 13.

apex, base about middle of eye; length of face 1.7 times the width, sides slightly acuate, median carina simple; antennae reaching a little beyond base of clypeus, first joint half the length of second; legs short, hind femora not reaching beyond apex of abdomen, tibiae longer than tarsi, first tarsus about equal to the other two together, spur as long as first tarsus. Tegmina reaching to eighth abdominal tergite.

Opening of pygofer large, about as long as broad, round, (in the figure the anal segment is shown greatly elevated and so the shape of the opening looks longer than broad, when the anal segment is in repose the shape of pygofer is more like that of *bridwelli*), dorsal emargination large, wide, embracing about half the anal segment, anal angles not produced; anal segment with two short spines on the under side not very near together; genital styles flat, broad, apex truncate with the angles slightly produced, outer and inner edges slightly concave; aedeagus flattened laterally, slightly curvd, broadest in middle, considerably narrowed at apex which is produced into a small point, right side with three small, flattened spines, left side with two spines.

Dark auburn or black, antennae, carinae of head and thorax, between the carinae of pronotum and over the mesonotum, median portion of pygofer and seventh and eighth abdominal tergites pale orange; legs light with longitudinal markings on femora and tibiae, apical tarsi dark. Tegmina opaquely or milky white, veins whitish with black granules bearing black hairs, a black mark at apex of clavus. The opaque whiteness varies, the membrane in some specimens being clear with brownish markings.

Female. Brachypterous; length 2 mm.; tegmen 1.1 mm. In color the female is generally lighter than the male.

Habitat. Haleakala (near the summit), Maui, 7000 feet elevation (*Bridwell,* August 1918) on *Tetramolopium humile.*

Described from fourteen males, fourteen females and twenty nymphs. The nymphs are light in color with darker markings somewhat similar to the adults but not so extensive, the tegminal pads are mostly all dark.

This species is very distinct and I cannot place it very near to any other species at present.

1. argyroxiphii (Kirk.)

I have not seen a male of this species. A female specimen taken by Swezey at the same time as the male figured by Kirkaldy* has the following dimensions:

Length 3.0 mm., tegmen 1.2 mm.; length of vertex 1.3

* Proc. Haw. Ent. Soc., I, Plate 4, fig. 6.

times the width, slightly widened towards the apex which is slightly rounded, base slightly in front of the middle of eye; length of face twice the width, sides slightly curved, median carina simple; antennae reaching slightly belond the base of clypeus, first joint half the length of second. Tegmina reaching base of fifth segment; hind femora considerably longer than tarsi, first tarsus longer than the other two together.

It is possible that this comes into the same group as *I. bridwelli* and *I. tetramalopii* but there are several distinct differences in structure.

I. monticola (Kirk.) Pl. IV, f. 10.

Vertex slightly longer than wide, apex slightly and broadly conical; length of face more than twice the width, median carina simple; antennae reaching to the base of the clypeus or slightly beyond, first joint about half the length of second.

The genitalia are close to those of *I. leahi* (Kirk.); the pygofer is slightly narrower, the anal spines large and diverging with a lobe from the anal segment basad of the spines, the genital styles are bent slightly more in the middle than is the case in *I. leahi;* aedeagus figured.

A long series of both sexes and nymphs from Haleakala, Maui, 7000 feet elevation, (*Bridwell,* August 1918) feeding on *Coprosma montana.*

I. rubescens (Kirk.)

Five males and one female, Haleakala, Maui (Puu Nianiau) on the phyllodia of *Acacia koa* (*Bridwell,* August 1918).

I. bridwelli n. sp. Pl. III, f. 3, Pl. IV, f. 20.

Male. Brachypterous; length 2 mm.; tegmen 1.5 mm. Length of vertex nearly double the width (1 to 1.9), sides subparallel, apex slightly conical, base well behind the middle of eye; length of face nearly two and one-half the width (1 to 2.4), sides slightly curved, median carina simple; antennae reaching slightly beyond base of clypeus, first joint half the length of second; hind femora not reaching beyond apex of abdomen, hind tarsi nearly equal in length to the tibiae, first hind tarsus equal to the other two together, tegmen reaching to anal segment.

Opening of pygofer large, wider than long, sides well rounded, dorsal emargination large, embracing about half the anal segment; spines on anal segment large, stout, not near together; genital styles flat, broad, widest at apex which is truncate with the lateral angles produced, narrowest in middle, (in a flat, lateral view the narrowness is not so great); aedeagus flattened laterally, rounded at apex, functional orifice near apex

on ventral aspect, three small curved spines near middle of dorsal aspect and one smaller spine more distad on right and two on the left side.

Black or brown; antennae, carinae of head and thorax lighter, legs brownish with darker longitudinal marks, apical tarsi brown, base of abdomen, dorsal aspect and edges of pygofer and a narrow stripe down abdominal dorsum yellowish or light brown. Tegmina hyaline slightly opaque or milky white with slight infuscation over the middle area veins concolorous as membrane with black granules bearing black hairs, a dark mark at apex of clavus and another at apex of costal cell and at apex of cubitus.

Female. Brachypterous; length 2.4 mm.; tegmen 1.7 mm. In color lighter than the male, being light brown. One female, perhaps immature, being yellow with tegmina immaculate except for the black granules which are very small.

Habitat. Haleakala, Maui, about 7000 feet elevation (near the small crater of Puu Nianiau) on *Argyroxiphium virescens.* (*Bridwell,* August 1918). Described from two males, four females and one nymph. The nymph is dark brown, lighter on carinae, at base of abdomen and mottled over tegminal pads.

This species comes near to *I. tetramalopii.*

I. cyathodis (Kirk.)

The forms associated under this species are of great interest as among them we have considerable chroötic but practically no phallic differences. Among continental faunae the differences found in such a form as *eeke* would be considered as of generic value, judging by some of the European and American genera. But as my studies of Hawaiian Delphacidae have been primarily based upon the genitalia, and as there is no doubt as to the close affinity of the forms in question, I prefer to associate them under *cyathodis* as subspecies and varieties,

After examining the new material from Maui I consider *fullawayi* as of only varietal value. The five forms I now class as follows:

Ilburnia cyathodis (Kirk.)
var. *fullawayi* (Muir)
var. *lanaiensis* (Muir)
var. *nigrinervis* Muir
subspecies *eeke* Muir.

I. cyathodis nigrinervis n. var.

Male. Brachypterous; length 1.5 mm.; tegmen .6 mm. Vertex as long as broad, apex slightly roundly produced, sides parallel, base in front of the middle of eye, head nearly as broad as thorax; length of face twice the width, median carina simple; antennae reaching barely to base of clypeus, second joint 2.6 times the length of first, first about as long as broad; hind femora not reaching beyond the apex of abdomen; tibiae longer than femora, tarsi equal to tibiae, first tarsus equal to the other two together; tegmina reaching to base of sixth segment.

Light brown over face and vertex, darker over apical portion of face and over clypeus, dark brown on thorax and black over abdomen. Tegmina hyaline, slightly opaque and faintly fuscous or brownish over the greater area, the apical cells clearer, all the veins fuscous or brownish. Fine, short hairs sparsely cover the head, thorax and abdomen, more perceptibly so on the face.

Female. Brachypterous; length 1.9 mm.; tegmen .9 mm.; in color lighter than the male.

Habitat. Haleakala, Maui (*Swezey,* August 1918) on *Cyathodes* sp. Descriped from thirteen males and sixteen females. There is one male specimen in the Bridwell collection from the same locality (7000 to 8000 feet elevation) on *Staphylea grayana* (*Cyathodes*).

I. cyathodis lanaiensis (Muir.)

Three males, four females and a nymph from Iao Valley, Maui, (*Bridwell,* August 1918) on *Cyathodes* sp.

I. cyathodis eeke n. subsp.

Male. Brachypterous; length 2 mm.; tegmen .8 mm. Vertex slightly longer than broad (1 to 1.20), sides parallel, apex slightly rounded, base about middle of eyes; length of face twice the width; head nearly as wide as thorax; antennae reaching to base of clypeus, scond joint 1.2 times the length of first, lateral carinae of pronotum straight, slightly diverging, reaching hind margin. Tegmina reaching to middle of fourth abdominal segment.

Head, thorax and legs dirty pale yellow orange, fuscous between carinae of head; dark, longitudinal marks on legs, abdomen black. Tegmina dirty pale yellow orange, veins without granules with very fine light hairs.

Female. Brachypterous; length 2.3 mm.; tegmen .8 mm. Similar in color to the male but abdomen often lighter.

Habitat. Mount Eeke, West Maui, 5000 feet elevation (*J. Rock,* August 1918) on *Argyroxiphium* sp.

Described from thirteen males and nine females. There is some little variation in color, the marks on the legs fading out entirely.

The genitalia of this subspecies is the same as in *I. cyathodis,* otherwise it differs in having a longer and narrower vertex, the tegmina are much shorter and the whole insect is proportionally longer and narrower.

I. longipes n. sp. Pl. III, f. 4; Pl. IV, f. 15.

Male. Brachypterous; length 2.3 mm.; tegmen 1 mm. Vertex longer than broad (1 to .8), sides subparallel, apex truncate, length of face more than twice the width (2.25 to 1) slightly broadened on apical half, median carina simple but slightly thickened on basal third; antennae reaching to middle of clypeus or beyond, basal joint very slightly shorter than apical joint; legs long, hind femora reaching beyond apex of abdomen, tibiae considerably longer than femora, tarsi considerably shorter than tibiae, first joint very slightly longer than other two, spur considerably shorter than first tarsus. Tegmina reaching to middle of abdomen.

Opening of pygofer about as long as wide, each anal angle of pygofer produced into rounded process which nearly meet in middle line and nearly surround the anal segment; anal segment without spines; genital styles slightly curved, narrowed in the middle, apical half subdiamond shape; aedeagus tubular, orifice at apex slightly ventrad, two small flanges at base on dorsal aspect, three large spines on dorsal aspect near apex; diaphragm produced into a ridge in middle with a shagreened surface.

Mustard yellow, fuscous between carinae of face and on gena forming two narrow lines on face and continuing onto the apical portion of vertex, brownish between carinae of thorax, on medio-lateral portion of abdomen, apex of labium and claws. Tegmina hyaline, light mustard yellow, veins darker, the subcostal, claval and middle of the median and cubital cells brownish, a darker mark running over the membrane from base of subcostal cell to apex of clavus; granules very sparse and minute bearing black hairs.

Female. Brachypterous; length 2.7 mm.; tegmen 1.3 mm. Similar in coloration to male.

Habitat. Olinda, Maui, 4200 feet elevation. (*Giffard* and *Fullaway,* May 1918) on *Cyrtandra mauiensis.* Described from three males and one female.

I. coprosmae n. sp. Pl. III, f. 2; Pl. IV, f. 21.

Male. Brachypterous; length 2.5 mm.; tegmen 1.4 mm. Vertex very slightly longer than wide, apex slightly broadened and rounded; length

of face two and one-half the width, sides nearly straight, median carina simple; antennae reaching nearly to the middle of the clypeus, second joint one and one-half the length of the first; legs fairly long, hind femora reaching beyond apex of abdomen, tibiae longer than femora, tarsi shorter than tibia, first tarsus longer than the other two together. Tegmina reaching to apex of abdomen.

Opening of pygofer about as long as broad, round; anal segment with two short, thick spines far apart, genital styles medium size, flat, truncate at apex where they are broadest; aedeagus small, laterally compressed, comparatively short and broad, a row of eight teeth along the dorso-apical portion slightly on right side and another on the apico-ventral area slightly on the left side, functional orifice at apex.

Black or dark brown; antennae, carinae of head and thorax, metathorax, anal segment, trochanters, base and apex of tibiae and femora lighter brown or yellow. Tegmina hyaline, fuscous at apex of clavus and expanding in an irregular manner as a faint mark across the corium to costa, the darkest markings being at apex of clavus, near the base and at the apex of the costal cell; veins the same color as the membrane, granules minute with black hairs.

Female. Brachypterous; length 2.6 mm.; tegmen 2.0 mm. In coloration similar to the male.

Habitat. Olinda, Maui, 4200 feet elevation (*Giffard and Fullaway,* May 1918) on *Coprosma montana.* Described from eighteen males and twenty-three females. As is the case in many of these insects there is a considerable range of coloration. It follows the line of the extension of the yellow areas on the head and thorax and of the reduction of the fuscous in the tegmen. Some specimens, especially the females, are very light in color.

I. stenogynicola n. sp. Pl. III, 5; Pl. IV, f. 22.

Male. Brachypterous; length 2.5 mm.; tegmen 1.7 mm. Length of vertex equal to the width at base, slightly narrowed towards apex, apex very slightly rounded; length of face nearly two and one-half times the width (1 to 2.4), very slightly narrowed at base, median carina simple, or forked at the extreme base; antennae not quite reaching to the middle of clypeus, first joint slightly shorter than second (1 to 1.3), legs moderately long, hind femora reaching to apex of abdomen, tibiae longer than femora, tarsi slightly shorter than tibiae, first tarsus slightly longer than the other two together. Tegmina reaching to apex of abdomen, apical cells well developed.

Opening of pygofer about as wide as long, sides slightly angular, anal spines short, stout, near together but not contiguous at base; genital styles moderately short, flat, broad, truncate at apex, narrowed at middle;

aedeagus tubular, slightly curved, tapering to a point at the apex, orifice near apex on ventral aspect, a row of six spines on right side from a dorsal position near apex to a ventral point about one-third from the base, the apical four are small, the fifth much larger, the basal or sixth spine largest, a similar row of spines run across the left side but two of the small spines are very small or missing.

Orange buff inclining to raw sienna, blackish between carinae of head and thorax, abdomen darker. Tegmina orange buff a dark mark at apex of clavus extending as a faint, broken, dark mark to near base of costa, costa dark on apical third, subcosta dark, and media and cubitus dark in middle, granules very small with black hairs.

Female. Brachypterous; length 3.5 mm.; tegmen 2.0 mm. Color similar to male but somewhat lighter over abdomen.

Habitat. Olinda, Maui, 4200 feet elevation (*Giffard* and *Fullaway,* May 1918) on *Stenogyne kamehamehae.* Described from seven males and three females.

This species is very distinct; it appears to go into the same group as *I. oahuensis* (Muir).

I. kokolau n. sp. Pl. IV, f. 4 a. b.

Male. Brachypterous; length 2.5 mm.; tegmen 1.8 mm.; length of vertex nearly one and one-half times the width (1 to 1.4), apex truncate with the median carina projecting, base considerably behind the middle of eye, sides subparallel; length of face twice the width, slightly narrowed at base beyond which the sides are subparallel, median carina furcate to near apex, near together but distinct; antennae reaching a little beyond the base of clypeus, first joint one-half the length of second; hind femora not reaching beyond apex of abdomen, tibiae longer than femora, tibiae slightly longer than tarsi, first tarsus slightly longer than other two together; tegmina reaching base of pygofer.

Anal spines short with wide bases which do not meet together; genital styles flat, outer margin nearly straight, inner margin emarginate on apical third, apex truncate; aedeagus subtubular on apical half, flattened laterally and widened on basal half, orifice on ventral aspect near apex, a few small spines near apex on dorsal aspect and a row of some ten spines from the same area across the right side to near the base, another row of spines from near orifice to near base along a ventro-lateral position on left side.

Ochraceous-tawny; claws, apex of rostrum and spines on legs darker, base of abdomen lighter. Tegmina hyaline, ochraceous-tawny, veins same color as membrane, granules very minute with dark hairs.

Female. Brachypterous; length 2.5 mm.; tegmen 1.8 mm. In coloration similar to the male.

Habitat. Ridge south of Iao Valley, West Maui (*Bridwell,*

September 1918) on *Campylotheca* sp. Kokolau is the generic name by which the Hawaiians know the species of *Campylotheca*. Described from one male and two females.

I place this species in the *cyrtandrae* group.

I. curvata n. sp. Pl. IV, ff. 1, 3.

Male. Brachypterous; length 2.9 mm.; tegmen 2.1 mm. Length of vertex 1.6 times the width, sides parallel, apex slightly rounded, base well behind middle of eye (one-third from back of eye); length of face 2.6 times the width, slightly narrowed between eyes, sides slightly curved, median carina simple with the extreme base slightly thickened; antennae reaching beyond the middle of clypeus, second joint 1.5 times the length of the first; hind femora extending slightly beyond apex of abdomen, tibiae considerably longer than femora and considerably longer than tarsi, first tarsus longer than other two together; tegmina reaching to the base of pygofer.

Opening of pygofer round, dorsal emargination large, genital styles widened on basal half on inner margin and again slightly about one-third from apex, outer margin slightly concave, apex truncate, spines on anal segment long, slender and curved, their bases not near together, aedeagus shaped somewhat like a bishop's crosier with crook at the apex.

Buff-yellow, antennae brown, slightly fuscous between carinae of face and over the carinae of throax, tegulae and a spot on mesopleura brown. Tegmina buff-yellow with a brown mark at apex of clavus and another at apex of costal cell, veins the same color as the membrane with very minute dark granules bearing dark hairs.

Habitat. Lupe ditch, Maui, 1200 feet elevation (*Giffard* and *Fullaway,* May 1918) on *Cyrtandra* sp. Described from one male. The genitalia of this specimen is not in the best condition but it is quite distinct enough to warrant a description and name, as it is so very distinct from any other species described. For the present I place it near *I. blackburni* (Muir).

I. acuta n. sp. Pl. IV, ff. 9, 11.

Male. Brachypterous; length 2.5 mm.; tegmen 1.6 mm. Vertex nearly as broad as long (1 to .9), apex slightly rounded, base at middle of eye, length of face nearly three times the width, slightly widest on apical half, median carina simple; Antennae reaching to middle of clypeus, second joint 1.4 times the length of first; hind femora not reaching beyond apex of abdomen, tibiae much longer than femora and than tarsi, first hind tarsus slightly longer than the other two together; tegmina reaching to base of eighth abdominal segment.

Opening of pygofer about as long as broad, dorsal emargination enclosing about half the anal segment, anal angles of pygofer not produced; anal segment with two short, stout spines; genital styles reaching nearly to the anal segment, flat, narrowest at middle, apex truncate, inner angle sharp, outer angle rounded; aedeagus tubular, straight, apex produced into an acute point, orifice on ventral aspect near apex, four spines on each side about one-third from apex, the more ventral ones the larger.

Pale orange yellow inclining to green; fuscous between carinae of head and thorax, apex of rostrum and claws of feet brown, slightly fuscous on dorsal aspect of abdomen. Tegmina pale orange yellow inclining to green in some specimens, a brown mark at apex of clavus and a small lighter mark at apex of costal cell, the dark mark at apex of clavus continuing as a faint infuscation across the tegmen to the base of costa, veins same color as membrane, no granules but a few fine, black hairs on veins.

Female. Brachypterous; length 2.7 mm.; tegmen 1.8 mm. The dark mark on tegmina not so pronounced as in the male.

Habitat. Ridge south of Iao Valley, West Maui (*Bridwell*, September 1st, 1918) on *Cyrtandra mauiensis.* Described from three males and three females.

This species apears to be nearest to *I. osborni* but it is very distinct.

I. waikamoiensis n. sp. Pl. III, ff. 1, 8.

Male. Brachypterous; length 3 mm.; tegmen 1.7 mm. Vertex longer than broad (1 to 1.4), base of vertex at middle of eye, apex very slightly rounded and very slightly narrower than base; length of face 2.5 times the width, sides slightly curved, slightly widened on apical half, median carina simple, slightly thickened on basal third or very narrowly and indistinctly furcate there; antennae reaching beyond the middle of clypeus, first joint slightly shorter than second (1 to 1.3); legs long, hind femora longer than tarsi, first tarsus longer than other two together; tegmina reaching to base of pygofer.

Pygofer round, opening wider than long, dorsal emargination deep, nearly surrounding the anal segment, anal angles produced into a bluntly curved point; anal segment without spines; genital styles reaching nearly to anal segment; widest at base and apical third, apex pointed; the armature on phragma forming a long, narrow process standing up from the phragma, the dorsal edge being slightly emarginate where the aedeagus passes over it, the ventral edge rounded, the entire surface shagreened; aedeagus long, semitubular, curved, orifice at apex on dorsal aspect, a row of teeth on each side, that on the left being more dorsad than the right, slightly curved, the teeth slightly longer and their bases joined together forming a narrow flange.

Light orange yellow; between the carinae of face, third tarsi and claws, the medio-lateral portions of the abdominal tergites, pygofer and styles slightly blackish. Tegmina darker orange yellow, a black mark at apex of clavus, slightly fuscous across the middle of tegmina in which areas the veins are slightly darkened, a faint mark at apex of costal cell, granules minute with black hairs.

Female. Brachypterous; length 3.3 mm.; tegmen 1.9 mm. Tegmina reaching to base of seventh tergite. In color similar to male but slightly lighter, the mark between carinae of face being faint or absent.

Habitat. Waikamoi gulch, East Maui, 4000 feet elevation, and Puohaokamoa, East Maui. Described from four males, three females and nymphs taken on *Cyanea aculeatiflora*, one male and one female on *Cyanea* sp. and one male and one female on *Pipturus* sp. (*Rock*, August 1918).

The young are orange yellow with dark claws, until the last stages when darker markings between carinae of face and on the tegmina begin to appear. This species comes into the same group as *I. wailupensis* (Muir) but it is quite distinct.

I. pulla n. sp. Pl. III, f. 6; Pl. IV, f. 17.

Male. Brachypterous; length 1.6 mm.; tegmen .9 mm. Vertex wider than long (1 to .6), apex slightly rounded, sides parallel, base well before middle of eye (two-thirds from hind margin of eye); length of face 2.2 times the width, sides moderately curved, median carina furcate from near apex; antennae reaching beyond base of clypeus, first joint half the length of second; hind femora not projecting beyond apex of abdomen, tibiae slightly longer than tarsi, first tarsus equal to the other two together; tegmina reaching to the middle of sixth segment.

Opening of pygofer a little wider than long, round; anal segment with two large spines near together at base; genital styles reaching nearly to anal segment, flat, widest at the base, narrowed about the middle, apex truncate; aedeagus strongly curved, base broad and laterally flattened, apex rounded, orifice on dorsal aspect near apex, four strong spines on right side on apical half, one on dorsal aspect near apex and four on left side.

Dark brown or nearly black, legs and base of abdomen lighter; tegmina brown, veins same color as membrane; no granules but some fine black hairs on veins also along apical margin.

Habitat. Mount Eeke, West Maui, 5000 feet elevation (*Rock*, August) on *Argyroxiphium* sp. Described from one male. I place this species near *I. incommoda*.

I. mauiensis n. sp. Pl. III, f. 10; Pl. IV, f. 5.

Male. Brachypterous; length 2.2 mm.; tegmen 1.4 mm. Vertex slightly longer than wide, apex bluntly conical, length of face 1.8 times the width in middle, sides slightly arcuate, median carina simple; antennae reaching to base of clypeus, first joint about one-half the length of second (1 to 1.8); hind tibiae longer than tarsi, first tarsus equal to the other two together; tegmina reaching to near base of pygofer.

Clear dull green-yellow, old cabinet specimens being much yellower; eyes, claws, spines on legs, teeth on spur, genital styles, aedeagus and anal spines brown. Tegmina green-yellow, veins same color as membrane, a few minute black hairs iregularly placed mostly alongside the veins.

Pygofer and genital styles as in *I. raillardiae*, the anal spines are not diverging and much nearer together; the aedeagus is long, broad on basal third and subtubular on apical two-thirds, orifice on the ventral aspect of apex, a row of eight broad spines runs along the right side from about the middle to the dorsal aspect of apex, a row of six along the ventral aspect of the apex with two or three small ones on the left side near apex.

Female. Brachypterous; length 2.1 mm.; tegmen 1.4 mm. In coloration similar to male.

Habitat. Wailuku Common, Maui (*Giffard* and *Fullaway*, May 1918) on *Campylotheca mauiensis* and three specimens from *Lipoechaeta integrifolia.* Described from sixtyfour males, eighty females and a number of nymphs. This species comes next to *I. incommoda* (Muir) from which it differs chiefly in the shape of the aedeagus.

This was originally described from a single male specimen with a broken aedeagus. I now have one male and five females from near the summit of Haleakala, Maui (*Bridwell*, August 1918) on *Raillardia menziesii* which I consider to be this species. The aedeagus is figured.

I. osborni (Muir). Pl. IV, f. 6.

This was originally described from a single male specimen with a broken aedeagus. I now have one male and five females from near the summit of Haleakala, Maui, (*Bridwell*, August 1918), which I consider to be this species. The aedeagus is figured.

Length of vertex 1.5 times the width, sides subparallel, apex slightly rounded, base about middle of eye; length of face double the width,

sides very slightly curved, median carina simple; antennae reaching slightly beyond base of clypeus, second joint slightly less than twice the length of the face. Tegmina reaching to base of pygofer.

I. neocyrtandrae n. sp. Pl. III, f. 9; Pl. IV, f. 7.

Male. Brachypterous; length 2.7 mm.; tegmen 1.6 mm.; length of vertex equal to width at base, apex slightly narrower, slightly rounded; length of face 2.3 times the width in middle, sides very slightly curved, median carina simple; antennae reaching to middle of clypeus or slightly beyond, second joint 1.3 times the length of first; legs long, first tarsus longer than the other two together; tegmina reaching to the base of seventh segment.

Opening of pygofer large, sub-diamond shape, dorsal edge deeply emarginate for the reception of anal segment which is "lipped" and has two short, thick spines on the ventral surface near together and pointing basad; genital styles large, reaching to anal segment, in full view they are narrow, straight and truncate at apex, in later view broad at the base, concave on the outer edge with a wide subangular projection about one-third from the truncate apex; aedeagus long, narrow and produced to an acute apex, orifice near apex on ventral aspect, a row of seven or eight short spines runs from the apex for about one-third of the length on each side, near to the orifice.

Sepia or bister; carinae of head, antennae, legs, base and middle of dorsum of abdomen lighter clay color; tegmina light clay color with a dark mark at apex of clavus and light fuscous from there to the base of costal cell, veins darker with very minute granules with fine black hairs, the apical margin and the apical veins much lighter.

Female. Brachypterous; length 3.2 mm.; tegmen 1.8 mm. In color on the average lighter than the male.

Habitat. Waikamoi trail, East Maui, 4000 feet elevation (*Rock*, August 1918) on *Gunnera petaloides*. Described from thirty-three males and fifty-six females.

By the genitalia this species comes near to *I. cyrtandrae*, the anal spines are much shorter, the row of spines on the aedeagus not so numerous and do not reach so far basad, the genital styles are narrower and the narrow apical portion much longer. In the series of 89 specimens there is not a great variation in color, a few specimen are slightly lighter than the type, more so among the females. The nymphs have the two median frontal carinae and the first joint of antennae very short, as is usual in this genus; the head, tegminal pads and apical portion of the abdomen are dark, the rest light.

I. mamake n. sp. Pl. IV, f. 8.

Male. Brachypterous; length 2.5 mm.; tegmen 1.8 mm.; vertex as long as broad, apex very slightly rounded; length of face nearly three times the width (1 to 2.8), sides subparallel, median carina simple; antennae reaching to the middle of clypeus, first joint half the length of the second; legs long, hind femora reaching well beyond apex of abdomen, tibia longer than femora, first tarsus longer than the other two together; tegmina reaching to base of pygofer.

The opening of pygofer large. slightly angular at sides, dorsal emargination large enclosing about two-thirds of anal segment; anal segment slightly lipped, two large, slender, slightly curved spines near together at base, directed basad and not visible when anal segment at rest; genital styles large, reaching nearly to anal segment, broad, flat, apex truncate with corners slightly produced, slightly angled at middle; aedeagus long, thin, subtubular, widest at base where it is slightly flattened laterally, slightly enlarged before apex which is pointed, orifice on ventral aspect at apex, three spines on the right side, in a dorso-lateral position near apex, over the ventral aspect and left side on the apical half there are some sixteen small spines, several being bunched together slightly basad of the orifice.

Black; antennae, carinae of head, genae beneath transverse carina, carinae and lateral and posterior edges of pronotum, legs, base and middle of abdominal tergites ochraceous tawny. Tegmina ochraceous, veins black except at extreme base and apex and over cross-veins, the black spreading out into the membrane, the apical margin, apical veins and cross-veins white or light ochraceous, granules very minute, sparse and bearing fine black hairs.

Female. Brachypterous; length 3.8 mm.; tegmen 2.1 mm. Tegmina reaching to eighth tergite. In color the female is lighter than the male, the light color of the carinae extending further afield.

Habitat. Waikamoi gulch, East Maui, 4000 feet elevation (*Rock*, August 1918) on *Pipturus* species (native generic name *Mamake*).

Described from nineteen males and fifteen females. The half grown nymphs have two median carinae, and the basal joint of antennae is annular; their color is ochraceous with blackish markings between the carinae of head and thorax, and over the middle of tegminal and wing pads.

This species is quite distinct by the genitalia, it comes into the same group as *I. oahuensis* (Muir).

I. raillardiicola n. sp. Pl. IV, f. 14.

Male. Brachypterous; length 2.4 mm.; tegmen 1.5 mm.; vertex as broad as long, slightly widened at apex where it is slightly rounded, base at middle of eye; length of face 1.9 times the width, median carina simple but broadened and indistinct at the base; antennae reaching slightly beyond base of clypeus, first joint half the length of second; hind femora reaching to the apex of abdomen, femora longer than tarsi, first tarsus equal to the other two together; tegmina reaching to end of abdomen.

Opening of pygofer a little broader than long, dorsal emargination large, embracing half the anal segment; spines on anal segment large, broad at base, diverging; genital styles near to those of *I. tetramalopii* with the angulation on the inner edge more pronounced, aedeagus flattened laterally, apex bluntly pointed, orifice near apex towards the left side, a row of fine spines along the dorsal aspect inclining to the right side, another row of some six spines on ventral aspect with three spines on the right side at the distal end of the ventral row, and two or three small spines on the left at the distal end of the dorsal row.

Head and thorax black or very dark brown, antennae, clypeus and carinae lighter, coxae and abdomen dark, legs, base of abdomen and anal segment lighter. Tegmina hyaline, light ochraceous, a brown mark from apex of clavus over the middle of tegmen to near base of media, another small mark at apex of costal cell, veins concolorous as membrane, no granules but a few very fine black hairs, margins light except at the apex of clavus. The tegmina are slightly raised or humped on the margins of clavus.

Female. Brachypterous; length 2.7 mm.; tegmen 2.0 mm. Tegmina reaching to apex of abdomen. Uniformly ochraceous orange, inclining to brown over the head and thorax.

Habitat. Haleakala, Maui, from 7000 to 8000 feet elevation (*Bridwell*, August 1918) on *Raillardia menziesii* and *Raillardia platyphyllum*. The nymphs are ochraceous orange, brownish over the head and thorax.

Described from seven males, twenty-one females and three nymphs.

There are also five males and six females from the same locality collected by Swezey.

I. painiu n. sp. Pl. IV, f. 16, a. b. c.

Male. Brachypterous; length 2.9 mm.; tegmen 1.8 mm.; length of vertex 1.5 times the width, slightly wider at the apex which is slightly rounded, base slightly behind the middle of eye; length of face twice the width, sides slightly curved, median carina furcate from near apex, the space between the forks raised so that it appears more as a wide carina than as two; antennae extending well beyond base

of clypeus, first joint half the length of second; hind femora not extending beyond the apex of abdomen, tibia slightly longer than tarsi, first tarsus considerably longer than the other two together (1 to 1.4); tegmina reaching to base of seventh segment.

Opening of pygofer large, about as wide as long, dorsal emargination embracing about one-half of the anal segment, anal segment with two long, straight, slender spines far apart at base; genital styles flat, narrow, slightly narrowed in middle, apex truncate; aedeagus slightly flattened laterally, bent in the middle to an angle of about 35 degrees, narrowest at the bend, orifice situated on a latero-dorsal aspect on the right side slightly before apex, a row of small spines on each side from the orifice to near the bend.

Light orange yellow, black between carinae of face, clypeus and genae, brownish on sides of pronotum, between carinae of mesonotum, over coxae, pleura and the lateral portions of abdominal tergites and sternites. Tegmina hyaline, light orange yellow, a dark mark at apex of costal cell and another at apex of clavus with a slight infuscation from the apex of clavus to base of costal cell, veins same color as membrane, no granulations but a few fine black hairs. The second male specimen has a darker head, the basal joint of the antennae as well as vertex and carinae of face being all dark.

Female. Brachypterous; length 3 mm.; tegmen 1.8 mm. In color much lighter than the male, being nearly uniformly light orange yellow, infuscate over head and basal joint of antennae.

Habitat. Ridge south of Iao Valley, Maui (*Bridwell*, September 1918) on *Astelia veratroides* (native name painiu). Described from two males and two females. This species is near to *I. nesogunnerae* (Muir).

I. coprosmicola n. sp. Pl. IV, f. 18.

Male, brachypterous. Width of vertex at base equal to length, apex slightly narrower than base, slightly rounded; length of face twice the width, narrowest between eyes, median carina forked at extreme base; antennae reaching to near middle of clypeus, scond joint twice the length of first; tegmina reaching to base of pygofer; first hind tarsus slightly longer than the other two together.

Dark brown or black; carinae of head, antennae, rostrum, legs, base of abdomen and anal segment yellowish or light brown. Tegmina hyaline, a dark brown mark at apex of clavus broadening out into a light fuscous band across tegmen from apex of costal cell to near base, being much fainter over the basal portion of costal cell, veins same color as membrane, granules very minute with black hairs.

Opening of pygofer deeper than broad, margins entire, dorsal emargination deep with anal segment sunk into the emargination, anal spines large, curved basad, wide apart; genital styles large somewhat like those of *blackburni* but with the apex more oblique; aedea-

gus figured from right side, no spines on left side except along ventral aspect and a bunch of smaller ones near apex.

Length 2.2 mm.; tegmen 1.5 mm.

Female, brachypterous. Similar in color to the male.

Length 2.9 mm.; tegmen 1.8 mm.

Habitat. Olaa, 27 miles, Hawaii (*W. M. Giffard,* August 1918) on *Coprosma ernodioides.* Described from nine males and ten females and some nymphs which are dark brown with some lighter markings. There is but little variation in color in the type series.

I. ulehihi n. sp. Pl. IV, f. 12.

Male, brachypterous. Length of vertex slightly greater than the width, apex slightly rounded, base at middle of eye; length of face 3.3 times the width, narrowest between eyes; antennae reaching well past the middle of clypeus; first joint shorter than the second (1 to 1.4); legs long, first hind tarsus longer than the other two together; tegmen reaching base of eighth segment.

Vertex, thorax and abdomen black, face light brown with the carinae and a thin longitudinal line between carinae brown, antennae, rostrum and legs brown, metathorax and base of abdomen salmon color. Tegmina hyaline, light brown, a black mark at apex of costal cell, another and larger one at apex of clavus which continues as a lighter mark diagonally to near the base of subcosta, veins at base and apex light brown, in middle fuscous, granules minute with black hairs.

Explanation of Plate III.

Fig. 1 *Ilburnia waikamoiensis,* pygofer full view.

Fig. 2 *Ilburnia coprosmae,* pygofer full view.

Fig. 3 *Ilburnia bridwelli,* pygofer full view.

Fig. 4 *Ilburnia longipes,* pygofer full view.

Fig. 5 *Ilburnia stenogynicola,* pygofer full view.

Fig. 6 *Ilburnia pulla,* pygofer full view.

Fig. 7 *Ilburnia tetramalopii,* pygofer full view.

Fig. 8 *Ilburnia waikamoiensis,* aedeagus, right side.

Fig. 9 *Ilburnia neocyrtandrae,* genital style.

Fig. 10 *Ilburnia mauiensis,* genital style.

Proc. Haw. Ent. Soc., IV. Plate III.

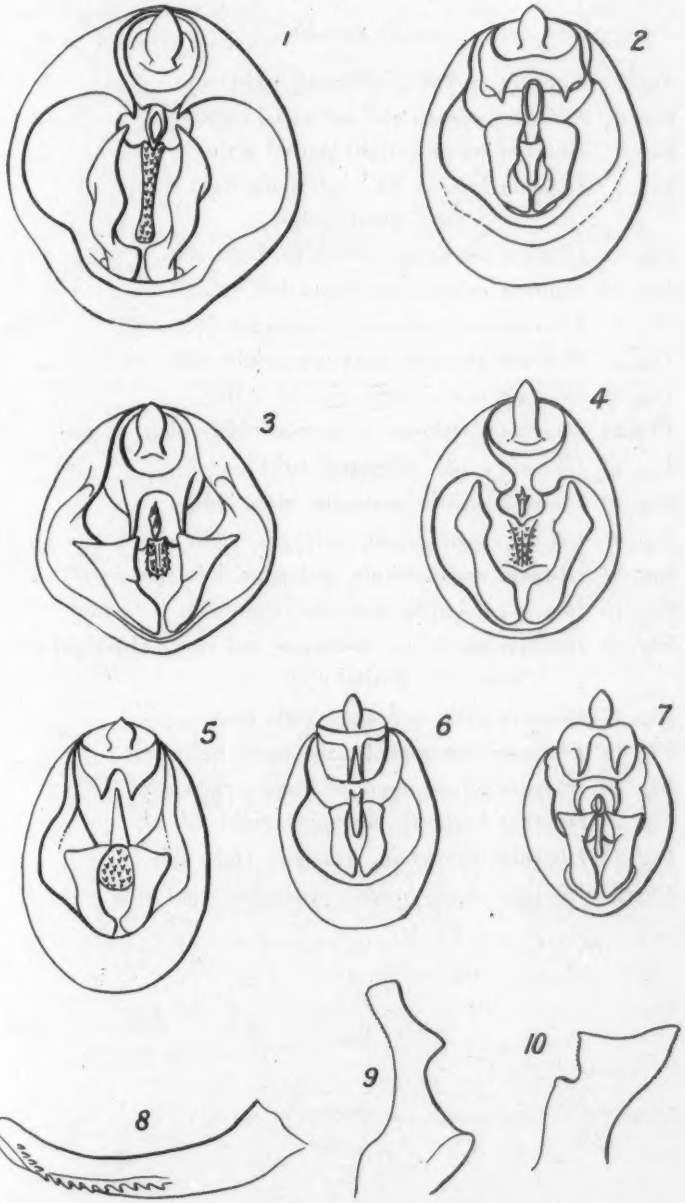


Plate IV.

Fig. 1 *Ilburnia curvata,* aedeagus, right side

Fig. 2 *Kelisia eragrosticola,* aedeagus, right side.

Fig. 3 *Ilburnia curvata,* right genital style.

Fig. 4 *Ilburnia kokolau* (a.) aedeagus, right side; (b.) right genital style.

Fig. 5 *Ilburnia mauiensis,* aedeagus, right side.

Fig. 6 *Ilburnia osborni,* aedeagus, left side.

Fig. 7 *Ilburnia neocyrtandrae,* aedeagus, left side.

Fig. 8 *Ilburnia mamake,* aedeagus, right side.

Fig. 9 *Ilburnia acuta,* right genital style.

Fig. 10 *Ilburnia monticola,* aedeagus, right side.

Fig. 11 *Ilburnia acuta,* aedeagus, right side.

Fig. 12 *Ilburnia ulehihi,* aedeagus, right side.

Fig. 13 *Kelisia sporobolicola,* aedeagus, right side.

Fig. 14 *Ilburnia raillardiicola,* aedeagus, left side.

Fig. 15 *Ilburnia longipes,* aedeagus, right side.

Fig. 16 *Ilburnia painiu* (a) aedeagus, end view; (b) right side view; (c) genital style.

Fig. 17 *Ilburnia pulla,* aedeagus, right side.

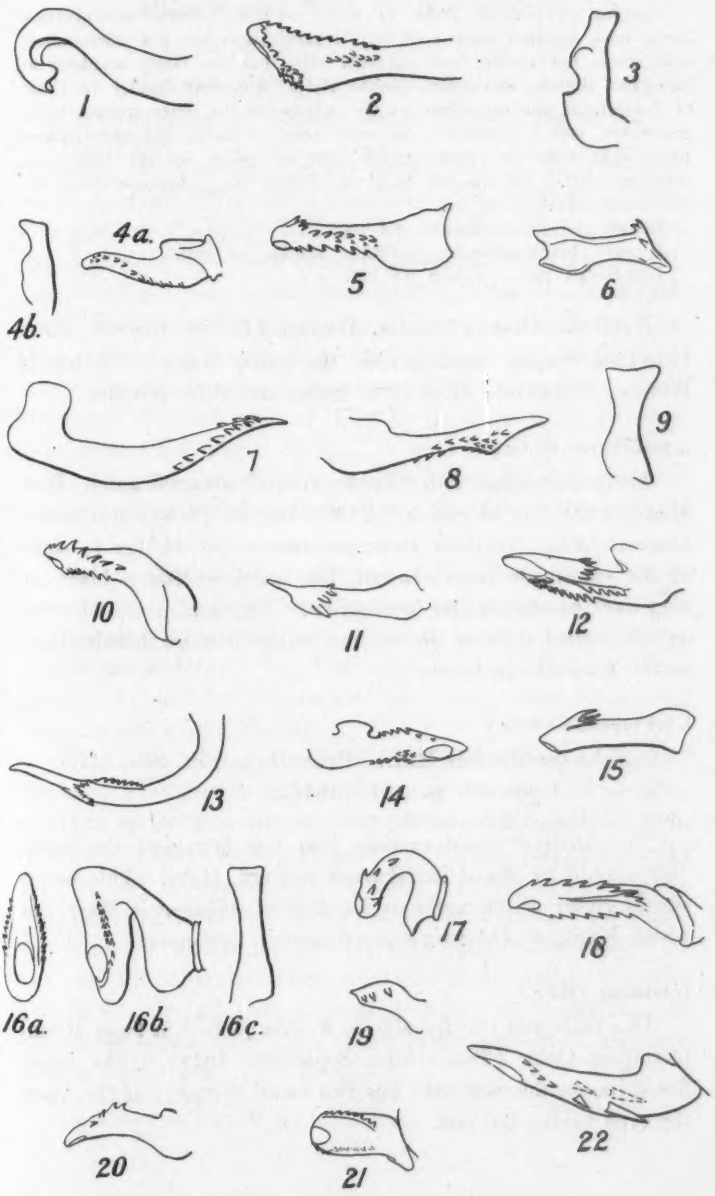
Fig. 18 *Ilburnia coprosmicola,* aedeagus, right side.

Fig. 19 *Ilburnia tetramalopii,* aedeagus, right side.

Fig. 20 *Ilburnia bridwelli,* aedeagus, right side.

Fig. 21 *Ilburnia coprosmae,* aedeagus, right side.

Fig. 22 *Ilburnia stenogynicola,* aedeagus, right side.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Opening of pygofer about as broad as long, dorsal emargination large, anal segment sunk well into emargination but not surrounded, anal spines not visible from external view, but are large, touching at base and slightly diverging; genital styles somewhat similar to those of *I bridwelli,* the projection in the middle of the inner margin more prominent, and a projection on inner edge at base; aedeagus figured from right side, the dorso-median row of spines on the right side continues distad on the left near the dorsal line, otherwise there are no spines on the left side.

Length 3.6 mm.; tegmen 2.2 mm.

Female, brachypterous. In color similar to male.

Length 4.5 mm.; tegmen 2.8 mm.

Habitat. Olaa, 27 miles, Hawaii (*W. M. Giffard,* June 1918) on *Smilax sandwicensis,* the native name of which is Ulehihi. Described from three males and three females.

I. blackburni (Muir.)

Three males and four females from Waikamoi gulch, East Maui, 4000 feet elevation (*Rock,* August 1918) on *Cyanea hammatifolia.* In color these specimens are similar to some of the specimens from Hawaii, the males having a black or very dark pronotum and mesonotum. The small comb of teeth on the ventral sides of the median orifice is more definite than in the Hawaii specimens.

I. wailupensis (Muir.)

Aloha wailupensis Muir. Proc. Haw. Ent. Soc. III, p. 181 (1916).

The median facial carinae join together near the apex. This should be placed in *Ilburnia* and not *Aloha.* This necessitates giving a new name to *Nesosydne wailupensis* Muir, for which I propose *Ilburnia neowailupensis,* new name.

I. lobeliae (Muir.)

One male and two females on *Kadua glomerata* from Mount Olympus, Oahu (*Timberlake,* September 1918). The large, flat spine on the anal tube has two small spines near the apex, the type having but one.

Miscellaneous Notes on Hymenoptera.

With Descriptions of New Genera and Species.

BY JOHN COLBURN BRIDWELL.

1. Hymenopterous Larvae with Falcate Mandibles.

Mr. C. E. Pemberton in his recent work on the life-histories of the fruit fly parasites has found that the Opiine Braconids and the Diapriid *Galesus Silvestrii* have the first larval stage provided with long falcate mandibles which are used to destroy other larvae in the same host. He has also in unpublished studies on the life-history of the parasite of the Lantana Agromyzid described in another paper in this issue as *Opius lantanae* found the same type of first stage larva. Oglobin found the same type of larva in the Coccinellid Braconid *Dinacampus terminatus* (Nees). I have found the same type in the Bruchid parasite *Heterospilus prosopidis* Crawford and Graenicher has found a similar larva in some of the parasitic bees.

On the other hand Pemberton and Willard in studies of the external parasite of lepidopterous larvae here described as *Microbracon Pembertoni* have found an entirely different type of first instar larva. The first stage larva of *Aphycus, Perilampus, Tetrastichus, Scutellista,* and many other Chalcidoid parasites are very different.

What then is the significance of the falcate mandibles? Are they phylogenetic in significance or adaptive? The latter seems to be the case and we may perhaps safely generalize in this way. Cetain species of parasitic Hymenoptera where the prey or host is concealed and successive parasitization is probable have independently developed the long falcate mandibles which give a means for one larva to destroy the other. At any rate in the cases studied one larva alone reaches maturity and in the case of some at least in which the mandibles are not so developed more than one parasite can reach maturity upon a single host.

2. Notes on Some Species of Echthromorpha in the Collection of the Hawaiian Sugar Planters' Association.

Echthromorpha maxima Krieger.

1 ♀ Piroe, Ceram. (F. Muir.)

Length 27 mm.; antennae 22 mm.; wing 23 mm.; ovipositor 14 mm.; about as long as the abdomen.

In the long ovipositor, short face and malar space and the somewhat humped first tergite, this species approaches the genus *Glyptogastra* Ashmead.

Echthromorpha notulatoria (Fabricius)

1 ♂ Loo Fou Chan, China. (F. Muir.)

Echthromorpha insidiator (Smith).

1 ♀ Amboina. (F. Muir.)

Echthromorpha immaculata Krieger 1908.

Echthromorpha diversor Morley 1913.

1 ♀ 4 ♂ Rewa, Viti Levu, Fiji Islands. (F. Muir.)

The ♀ has not been previously described.

Length 13 mm.; wing 11 mm.; abdomen 8 mm.; ovipositor 4 mm.

Antennae 32 jointed, about as long as the body, fourth joint not quite as long as the fifth and sixth together, remaining joints successively shorter to the penultimate, which is a little longer than broad, ultimate joint a little longer. Head yellow, somewhat suffused with reddish, eyes dark, front and occiput blackish, scape yellow, antennae reddish. Head somewhat shining with a few uneven and irregular shallow punctures.

Prothorax and mesonotum largely reddish, varied with yellow, a broad longitudinal median band on the mesonotum suffused with black, mesopleura and mesosternum, sides of propodeum and a suffused median longitudinal band on its declivity black; elevation beneath the wings, disc of scutellum and metanotum, suffused area on either side the apex of the propodeum yellow with more or less reddish surrounding. Mesonotum dullish with shallow oblique punctures more or less disposed in median and parapsidal groups, mesopleurae above smooth and shining, below and

in front somewhat coarsely punctured on a shining ground, propodeum somewhat punctured and transversely striate above the stigmata.

Abdomen with tergites 2-4 black, remainder reddish, a yellow spot on either side the apex of the first tergite; tergum smooth and highly polished with some scattered punctures, somewhat more punctate laterally.

Legs yellowish, hind and middle tibiae more or less reddish. Wings yellowish hyaline, the nervures brown.

Mr. Timberlake who has checked over the description of *E. immaculata* and *E. diversor* agrees in synonymizing Morley's species.

Echthromorpha fuscator (Fabricius).

While on the subject of *Echthromorpha* it may be noted that after diligent efforts to find females corresponding to the ♂ described by Cameron as *flavo-orbitalis* I have never taken or seen a female with yellow orbits. Males with the characters of *flavo-orbitalis* Cameron are not uncommon among the smaller individuals. I am convinced that *flavo-orbitalis* is only a weak color variety of *fuscator* (*maculipennis* Holmgren) connected by intermediates with the larger normal form. The species is abundant at all elevations in the Hawaiian Islands, attacking numerous species of endemic and immigrant lepidoptera.

3. Glyptogastra Ashmead.

It is curious that *Echthromorpha fuscator* (Fabr.) should be so common and adaptable to various endemic and immigrant hosts while its allies in *Glyptogastra* remain rare.

Glyptogastra Ashmeadi Perkins.

Has only been taken in the Koolau Range of Oahu at elevations of 1500-1800 feet and always singly. Probably not more than a dozen specimens at the outside have ever been taken but they may be more common than seems for in flight they very much resemble the omnipresent *Echthromorpha*.

The ♀ has never been described. It resembles the ♂. The mouth parts, edge of clypeus antennae, legs from the trochanters on suffused edges of the tergites and two or three ultimate tergites reddish, rest of body bronze, wings dusky hyaline.

Length 11 mm.; wings 9 mm.; abdomen 7 mm.; ovipositor 4 mm. Antennae about as long as the body.

Glyptogastra hawaiiensis Ashmead.

A single ♂ specimen of *Glyptogastra* taken on the foliage of *Acacia koa* at Olinda, Maui, was at first supposed to represent a new species but having only ♀ of *Glyptogastra hawaiiensis* Ashmead for comparison the question remained unsettled. Another specimen in the Bishop museum from Maui is somewhat intermediate in the supposed differentiating characters. I believe the species has not previously been reported as occurring on Maui.

Since writing the note above the examination of three ♂ *Glyptogastra hawaiiensis* taken by Mr. W. M. Giffard, one from Iao Valley, Maui, March 6, 1909, and two from Kilauea, Hawaii, 1911 and 1912, make the reference of the Maui specimens to this species certain. The single ♀ known to be in the collections in the Islands is in the collection of the Hawaiian Sugar Planters' Association and was taken by the late F. W. Terry in the koa forest at Kilauea, Hawaii, June 3, 1905.

The more metallic coloration of *Ashmeadi* with the reddish bands of the abdomen make it easily distinguishable from *hawaiiensis.*

4. Amblyteles Koebelei (Swezey).

I had always supposed that *Ichneumons* parasitized the pupae of lepidoptera but an observation made June 16, 1918, upon this species showed a different procedure. While coming down near the base of one of the ridges of the Waianae Mountains above Waipahu, Oahu, at about 3 p. m., a large, full-fed cutworm was observed in violent contortions on the ground. Upon examination it was found that it was being attacked by a large ichneumon which was stinging it in various places. It

was so intent upon this that it permitted me to pick it up by the wings and it held its grip so strongly that the cutworm was lifted with it. Both were placed in a tube and this plugged with cotton but unfortunately both ichneumon and cutworm escaped through the cotton plug which had been made too loose to retain them.

Mr. Swezey informs me that this must be the normal method of attack for this species since the cutworms from the pupae of which it has been bred are usually subterranean. The cutworms emerge from shelter in the late afternoon preparatory to feeding and it is at this time which the *Amblyteles* has been observed most active on the wing.

Mr. Timberlake, who has examined this species, places it in *Amblyteles*. It was described as an *Ichnèumon*.

BRACONIDAE.

5. Hawaiian Vipionine (formerly Braconinæ) Braconidae.

1. Second abscissa of radius shorter than the 1st transverse cubitus, propodeum and abdomen neither entirely smooth nor distinctly sculptured, being microcsopically shagreened, coloration exceedingly variable, sometimes entirely reddish yellow, except the eyes and antennae, thorax and abdomen usually largely black; ♀ antennae 14-15 jointed, rather short and stout, ovipositor shorter than abdomen; a common parasite of *Ephestia elutella*, etc. .... **Habrobracon hebetor* (Say)

   Second abscissa of radius longer than the 1st transverse cubitus, ♀ antennae more than 14 jointed, slender.... 2

* I have seen a single specimen, possibly another species, in which the antennae are 12 jointed, the thorax and abdomen black and there are black markings on the head.

2. Head, thorax, and abdomen highly polished and shining, black, abdomen and legs in part yellowish, ovipositor about as long as head, thorax and abdomen together, a parasite of *Tephritis* in *Bidens* ....*Microbracon Terryi* Bridwell

Head and thorax not entirely black, ovipositor elongate in only one predominently red species..... 3

3. Predominently red, thorax highly polished and shining, abdomen rugulose, ovipositor about as long as abdomen and thorax.....*Microbracon Pembertoni* n. sp.

Ovipositor not longer than abdomen; if predominently reddish, the propodeum rugulose 4

4. Thorax black except the parapsidal marks, these with radiating silvery hairs on their margins; abdomen smooth with copious silvery hairs..... .... *Microbracon omiodivorum* (Terry)

Head, thorax and abdomen predominently reddish yellow, abdomen rugulose with only a few feeble hairs ..... *Microbracon Swezeyi* n. sp.

All the species are immigrants into the Hawaiian Islands.

Microbracon Terryi Bridwell.

Described in a subsequent paper in this number.

Microbracon omiodivorum (Terry).

Macrodyctium omiodivorum Terry.

Expt. Sta. Hawn. Sugar Planters' Assoc. Div. Ent. Bull. 5:37 ♀ ♂ Hawaii 1907.

Bracon omiodivorum Perkins.

Fauna Hawaiiensis 1:cxi. 1913.

The material studied by Terry is present in the collection of the Hawaiian Sugar Planters' Association. It consists of 14 ♀♀ and 14 ♂♂ taken from 1905 to 1907 and includes individuals from Hawaii, Maui, Oahu and Kauai. These have

been labelled as *Cotypes*. There are also in this collection two individuals taken by Mr. Terry at Hong Kong. Mr. Swezey has published the opinion that this species was introduced into the Islands from Japan by Mr. Koebele and has recorded it as breeding upon *Nacoleia accepta* (Butler), *N. Blackburni* (Butler), *Hymenia recurvalis* (Fabricius) and *Archips postvittanus* (Walker), all leaf rolling Lepidoptera.

Microbracon Pembertoni n. sp.

Bracon sp. Swezey. Proc. Haw. Ent. Soc. 3:109. (Last entry so headed). 1915.

♀. Red; tips of mandibles, palpi more or less, antennae, eyes, ocelli, propodeum more or less (often only very slightly, at the insertion of the abdomen), ovipositor sheaths, tarsi and apex of hind femora more or less, black or blackish. Wings fuscous subhyaline, nervures the same except that the costa basally is reddish and the stigma is yellow.

Head and thorax highly polished and shining; the tergites rugulose, the connate second and third tergites more coarsely so. Suture of the second and third tergites crenulate; suture between the third and fourth (free) tergites smooth, a sulcus there but indefinite behind.

Antennae about 40-jointed, about as long as the body, ovipositor about three-fourths as long as the head, thorax, and abdomen together.

Length about 4 mm.; wings 5 mm.; ovipositor 3 mm.

♂. Similar to the female but smaller.

Described from 24 ♀♀ and 22 ♂♂ collected or bred on the island of Oahu, the earliest record being in April, 1914.

Type ♀ and allotype ♂ in the collection of the Hawaiian Entomological Society, paratypes in the U. S. National Museum, in the collection of the Hawaiian Sugar Planters' Association and in the private collections of P. H. Timberlake and of the author.

It has been bred from berries of *Lantana camara*, probably from the larva of *Crocidosema lantanae* by O. H. Swezey and J. C. Bridwell, from *Pectinophora gossypiella* by D. T. Fullaway, C. E. Pemberton, and H. F. Willard, and from *Myelois ceratoniae* and *Cryptophlebia illepida* the former in pods of *Acacia farnesiana*, the latter in the same and in the pods of *Acacia koa* (J. C. Bridwell).

The species is named for C. E. Pemberton, whose studies of the biology of the parasites of fruitflies have been of unusual interest. He began studies of the life history of this species which have been continued by H. F. Willard. To Mr. Willard I am indebted for a series of specimens of this species bred from *Pectinophora gossypiella* in the course of his studies upon the species.

Since writing the description above Mr. Willard has shown me specimens used in refrigerator experiments in which the mesosternum is largely black.

Microbracon Swezeyi, n. sp.

Bracon sp. and *Bracon* sp.? Swezey. Proc. Haw. Ent. Soc. 3:109. 1915.

♀. Yellow, tips of mandibles, edges, ocelli, antennae, ovipositor sheaths, ungues and apex of last tarsal joint black or blackish, head more or less piceous, propodeum and 1st and 2nd tergites suffused with fuscous sometimes pale, wings grayish hyaline, the nervures colorless, very translucent, the second transverse cubital nervure obsolescent.

Head and thorax highly polished, smooth and shining; propodeum reticulorugose, the spaces round but hardly punctiform, a crenulate line down its middle; abdomen rugulose, tergites 1-3 longitudinally, the following transversely and more finely rugulose; furrow between the first and second tergites smooth narrowly interrupted in the middle; furrow between the connate second and third tergites crenulate, tergites 4, 5 and 6 contracted at base, hardly furrowed.

Antennae about 36-jointed, not as long as the head, thorax and abdomen together; ovipositor short, not more than half the length of the abdomen.

Length 3.5 mm.; wing 3 mm.; ovipositor .75 mm. These are the measurements of the type. The other ♀ ♀ are considerably smaller.

♂ Similar, the abdomen very slender.

Described from 1 ♀ (the type) bred by O. H. Swezey from *Bactra straminea* (Butler), Jan. 7, 1913, 4 ♀ and 2 ♂ bred from *Batrachedra cuniculator* Busck May 4, 1914, Lepidoptera whose larvae feed in the brackish-marsh sedges in the Kewalo district of Honolulu. I have also 1 ♀ taken at Waikiki in 1917, and 6 ♀ and 2 ♂ taken in the marshes there May 30, 1919 (Bridwell).

Type ♀ and allotype ♂ in the collection of the Hawaiian Entomological Society, paratypes in the collection of the Hawaiian Sugar Planters' Association, in the U. S. National Museum, and in the author's collection.

Named for Mr. Swezey, who first bred this little species, as he has so many of the immigrant parasites.

ALIENIDAE.

6. A Peculiar Wingless Hymenopteron Forming the Type of a New Genus and Family.

The apterous insect described below is so peculiar that it will not fall into any of the families at present recognized, and rather than alter the limits of some recognizable family to include this highly anomalous form it has seemed better to erect for it a family of its own Alienidae. Even so it remains doubtful in what superfamily this genus should find place.

Alienus n. gen.

Head slightly broader than the thorax and abdomen, quadrate in the dorsal aspect, declivous in front and prolonged into a short snout in front of the large oval facetted eyes which occupy the greater part of the sides of the head. Face concave for the insertion of the antennae and coarsely obliquely striate. Antennae inserted just in front of the mouth near the mandibles which are small nearly straight and conical without teeth, malar space longer than broad; mouth cavity small, triangular, margined, anterior to the eyes, no evident gular cavity or suture, ocelli moderate, arranged in an acute triangle, the posterior pair adjacent to the inner orbits and considerably more than their distance apart before the occipital margin, occiput finely margined. Antennae filiform, 13-jointed, strongly geniculate, scape subcylindrical elongate, a little thicker toward the base, flattened on the side next the flagellum, about as long as the pedicel and first three flagellar joints not quite attaining the level of the anterior ocellus, pedicel elongate, half as long as the first flagellar joint, second and following joints successively shorter, the last five each about as long as broad, the last joint about as long as broad and narrower and rounded at apex.

Pronotum loosely articulated with the mesonotum, quadrate, massive, truncate in front and slightly arcuately emarginate behind with

the lateral angles a little prolonged, a little narrower than the mesonotum and about as long as the mesonotum and scutellum together; propleura and prosternum loosely articulated with the pronotum; prosternum small, transverse, bounded laterally and in front by the propleura which meet broadly below, above they are separated by a small free cervical sclerite.

Mesonotum slightly convex transversely, transverse slightly arcuate behind, laterally finely margined, scutellum transverse a little narrower and shorter than the mesonotum and separated from it by a straight simple furrow which does not attain the lateral margins, impressed obliquely at either side at the end of this furrow.

Propodeum quadrate, narrower than the pronotum, slightly transversely convex in the same plane with the mesonotum, separated from it by a shallow furrow, bounded posteriorly by a fine line similar to the transverse striations of its surface, the declivity transversely rounded but exactly vertical as seen from the side.

Mesopleura convex depressed beneath the ridge formed by the projecting margin of the mesonotum, a curved foveolate furrow leading up to the posterior margin of the mesonotum from the round pit just above the middle coxae, sides of propodeum concave.

Legs rather slender, not at all spinose, all the coxae contiguous, the femora slightly thickened, the anterior and posterior more so than the middle femora, hind trochanters two jointed; front and middle femora about as long as their tibiae, the hind tibiae longer than their femora; calcaria feeble 1, 2, 1, calcaria of the middle legs unequal, hind calcaria curved, basitarsi slender elongate, a little shorter than their tibiae and about as long as joints 2-5 of the tarsi, all the joints sub-cylindrical, ungues small.

Abdomen oval, slightly broader than the mesonotum, convex above and beneath with four visible tergites and sternites; tergites 1 and 2 subequal, occupying the greater part of the tergum, sternite 1 emarginate behind much smaller than 2 which occupies the greater portion of the venter, other sternites and tergites transverse, the tergites and sternites are simple, without depressed margins or other special structures except that tergite 1 has a feeble imperfect elevated line at the edge of the declivity. Type *Alienus aenigmaticus* Bridwell.

Alienus aenigmaticus n. sp.

Sex, indeterminate.

Black, the vertex and face with dark bronzy greenish metallic reflections, pedicel and 1st and 2nd flagellar joints and legs, from the coxae on, yellowish testaceous.

Concavity of face shining, coarsely transversely striate with the ends of the striae directed downward, above these some striae parallel to the orbits, vertex smooth and shining finely and sparsely punctate, a shallow depressed space on the vertex behind the ocelli; pronotum with

shallow scattered punctures the integument between microscopically lineolate, shining, mesonotum and scutellum much the same, propodeum finely transversely striatorugulose with a smooth posterior narrow band separating the upper face from the somewhat more distinct transverse striae of the declivity; mesopleura shining with rather coarse scattered punctures, sides of propodeum smooth and shining with some longitudinal striae on the lower part of the concavity. Hind coxae outwardly transversely striate.

Abdomen minutely transversely lineolate with feebly indicated shallow scattered punctures.

Length 3.3 mm.; width of head .8 mm.

One individual found running on the ground, Mowbray Golf Links, Capetown, South Africa, April, 1915 (J. C. Bridwell).

Type in the author's collection.

Affinities. The form of the head and insertion of the antennae on the extreme anterior margin of the head seem to show affinity with the Ceraphronidae but the form of the prothorax and the 13 jointed antennae seem to forbid association with them. The form of the head and mandibles, the long scape and pedicel, the slender legs and four segmented abdomen forbid association with the Bethylidae, Embolemidae and Dryinidae, the short hind coxae forbid association with the Psammocharidae. The absence of a basal constriction of the abdomen and many other characters forbid association with other families of the Scolioidea. On the whole, this insect would seem to fall in the Serphoidea but for the present it seems better to consider it as the monotypic representative of a family Alienidae rather than to modify any of the existing families for its reception.

TIPHIIDAE.

7. Epimodiopteron Romand.

Scoliphia Banks Can. Ent. 44:201. 1912

Epimodiopteron spilota (Banks). Arizona.

I have seen specimens of this species from the Stanford University collection collected by W. M. Mann in Arizona

through the kindness of Prof. Vernon Kellogg. I can find no important differences between Banks' genus and *Epimodiopteron.*

8. Paratiphia.

It seems very doubtful if this genus can be maintained since extra-American species are found which present singly two of the three characters by which the genus is separated from *Tiphia.* The first abdominal segment may be carinate without the white clypeus of the ♂, while the venation is normal for *Tiphia,* or the venation may be like *Paratiphia* and the other characters like *Tiphia.*

EUMENIDAE.

9. What Is Abispa australiana Mitchell?

The late Mr. Meade Waldo (Ann. Mag. Nat. Hist. (8) 14:461, 1914) synonymized Mitchell's genus *Abispa* with *Polistes,* reviving Saussure's *Monerobia* for this interesting genus of Australian Eumenidae. That this course should not be followed was my conclusion after examination of Mitchell's work, and the two Hymenoptera involved in the question.

Mitchell's Journals of 1831-2 were prepared for publication in 1838, seven years after Mr. Mitchell and his friend were stung by the ferocious *Polistes tepidus.* It is evident that the description was drawn up at the latter date and from this description it is easy to see that the great explorer was far from being familiar with entomological terms. If one compares the description of the insect which he gives with *Polistes tepidus* and Smith's *Abispa australis* it seems perfectly clear that, in the seven years intervening between his expedition and the publication of his Journals that he had become confused as to the identity of his assailant and described the largest and most ferocious-looking of the wasps he had collected under the influence of this confusion.

Since the original description is not readily accessible to entomologists its reproduction is desirable. It is found as a

footnote on page 104 of volume one of his Three Expeditions into the Interior of Eastern Australia and reads as follows: Genus, VESPA; subgenus, ABISPA; species *Abispa Australiana* (mihi).

> Head, antennae, and feet yellow; eyes black; the scutellum of prothorax yellow; the scutum of mesothorax black; with the scutellum yellow; the scutum of the metathorax yellow, with the scutellum black and the axillae yellow. The wings yellow, with dusky tips. The first segment of abdomen has the petiole black. The second segment is black and the rest yellow.

It is clear that the interpreting "the scutellum of the prothorax" as the pronotum, "scutum of metathorax" as the metanotum, "scutellum" of the same as the superior face of the propodeum, and the "axillae" as the posterior lateral angles of the propodeum and allowing a little inacuracy in the statement that the second abdominal segment is black, we have a reasonably close description of *Abispa australis* Smith.

It is especially to be noted that Mitchell does not use the name in the text.

It seems clear that the stinging insect mentioned in the text is *Polistes tepidus* (Fabricius), but it seems equally clear that the insect described in the footnote is *Abispa australis* Smith and that accordingly we must retain the name *Abispa* for the genus of Australian Eumenid wasps in preference to Saussure's *Monerobia.*

In Della Torre's Catalogue an error has crept in in citing *Abispa ephippium* Mitchell. There is no such combination to be found in the work indicated. Smith has given the same erroneous reference. Both are doubtless based on Saussure's supposition that *australiana* is identical with *ephippium.* There is, however, no reason to suppose this is the case.

The synonymy then may read:

Abispa Mitchell 1838.
=(*Monerobia* Saussure) 1852.
=(*Polistes* Meade Waldo) 1914 nec Latreille.
Type *Vespa* (*Abispa*) *australiana* Mitchell 1838. Monobasic.

Abispa australiana Mitchell 1838.

=(*Abispa australis* Smith).

Cat. Hym. Brit. Mus. 5:42. 1857.

These notes were based upon material kindly placed at my disposal for study in the Queensland Museum in 1915.

10. Nesodynerus Rudolphi (Dalla Torre).

On one of the outer ridges of the Waianae Mountains at an elevation of about a thousand feet are some exposed boulders. On a protected side of one of these, beneath which a projection made a suitable place for them were found on June 15, 1918, some mud nests of *Sceliphron cementarius,* some of the cells having in them pupae or tenerous adults. From others they had emerged and these were being utilized by *Odyneri* for their nesting places. One female *Nesodynerus Rudolphi* was taken within one of the cells, while others contained lepidopterous larvae brought there by the wasps. Two contained *Odynerus* larvae, one full fed and in the other were caterpillars as well. One contained a single egg, elliptical in outline about twice as long as broad and suspended by a thread not quite as long as the egg itself. These were brought in for study.

The caterpillars used for larval food were all those of *Amorbia emigratella* Busck which I found later feeding beneath a web on the flower shoots of *Dracaena.* The number employed could not well be made out on account of the breakage of the cells when they were removed from the rock, probably six or eight, however, were required for a single cell. Each cell of the *Sceliphron* was divided by an earthen partition and served for two cells of the *Odynerus.*

The larva which was still feeding, during the day and night since being brought in, had eaten all it cared for of two caterpillars. It sinks its head into the body of the caterpillars in front of the prolegs and feeds voraciously like a caterpillar upon the substance of the caterpillar within the skin, its mandibles being in constant motion. Two of these larvae were completely devoured and the third was half eaten.

The caterpillars were all in a living condition and moved slightly at their extremities when disturbed, but were incapable of locomotion.

The egg was found at about two o'clock June 15, 1918, and hatched June 18, but the larva died without feeding.

11. Odynerus pseudochromus Perkins.

The nests of this species are made in the pith cavities of dead twigs and branches, the cells being separated by weak mud partitions. Usually from one to three cells are to be found in a place. One nest found on Mt. Lanihuli was stored with the larvae of the Ohia Tortricid (*Eccoptocera foeterivorans* Butler). There were about a dozen of the larvae in one cell. The egg was near the bottom of the mass of larvae and was attached by a thread shorter than the egg.

TRYPOXYLONIDAE.

12. Pison in the Hawaiian Islands.

The following table will serve to distinguish the three species of *Pison* which are now known to be established in the Hawaiian Islands:

1. First and second recurrent nervures interstitial with the 1st and 2nd transverse cubital nervures..... ..... *iridipennis* Smith
   Second recurrent received by the second cubital cell..... 2
2. First recurrent interstitial with 1st transverse cubitus calcaria of hind tibiae pale.....*argentatum* Smith
   First recurrent received by the first cubital cell. Calcaria of hind tibiae dark.....*hospes* Perkins

HYLAEIDAE.

13. Some Segregates from Hylaeus.

The processes of type-fixation now under way involve a number of changes in nomenclature which are not greatly welcomed by many of us whose tendencies are conservative and in many cases type fixation results in obvious violation of the

wishes of the author of the genus. This has been the result particularly with the work of Fabricius where his carelessness in the inclusion of extraneous forms has resulted in such extraneous forms being made types of his genera. Such a case is that of *Prosopis* and *Hylaeus*. The type fixation here has not been recent but it has been disregarded until recently and the change of names so forced upon us is far from pleasant. But it seems to me that instead of grieving over our wounds and delaying the acceptance of necessary changes we should hasten the process of type fixation and be done with the whole unpleasant business. Recent investigations on my part of the status of several of the older names in the bees has thoroughly convinced me that no possible stability in nomenclature can be secured without a thoroughgoing acceptance of the principle of a single type for every genus and family. Such researches are entirely out of the reach of most of us who have not free and continuous access to the larger entomological libraries, and it is to be hoped that those who have such opportunity will hasten the completion of this work. More than this, it seems to me that the next revision of our nomenclatorial code should further clarify our rules regarding type fixation and an important addition made which would refuse to recognize any subsequently formed genera for which no type is established upon publication.

Hylaeus Fabricius, whatever the original intention of the author, (as has been recently called to our attention by Morice and Durrant) was fixed as the proper name for the bees which all more recent authors have called *Prosopis* when Latreille in 1802 fixed *Apis annulata* Linne as its type. Whether we accept the Elangen list or not, the type of *Prosopis* "Jurine" of that list (1801) is congeneric with the type of *Hylaeus* and that of *Prosopis* Fabricius (1804) is identical with that of *Hylaeus*. There is no escape then from sinking *Prosopis* and reviving *Hylaeus* even if Fabricius, as nearly as he ever came to recognizing genera, wished to make *Hylaeus*=*Halictus* and to give the name *Prosopis* to the bees so long known under that name.

However, before we transfer *en masse* the heterogeneous species described under *Prosopis* to *Hylaeus* it will be well to segregate some of the species into proper genera.

The following table will serve to distinguish some genera, described species of most of which have been placed in *Prosopis*. This work of segregation is far from complete. Certainly most of the Australian species described as *Prosopis* will not fall in any properly defined genus *Hylaeus*. Neither material at hand nor time permits an investigation of all the genera which should fall into the *Hylaeidae*.

TABLE OF SOME GENERA OF HYLAEIDAE.

1. Mandibles flattened at apex or tridentate or bidentate in both sexes 2

Mandibles acute at apex, edentate, elongate, nearly straight, propodeum rugose, angulate at the sides and subcarinate, the triangular basal area well defined with its sculpture different from the rest of the propodeum, first recurrent nervure received by the first cubital cell or interstitial, the second interstitial with the second transverse cubitus or received *beyond* it, supraclypeal area short, bounded by lateral carinae. Face broad, usually broader than long, clypeus trapezoidal, about as high as broad at its anterior margin, labrum triangular.

♂ Stipes greatly produced apically into a slender process nearly as far beyond the apices of the sagittae as their length, eighth sternite with a short rounded median process.

Coloration. Thorax black, frequently with yellow and ferruginous markings, legs and first segment of the abdomen usually more or less ferruginous .....*Nothylaeus* n. gen.

2. Mandibles bidentate at apex 4

Mandibles tridentate at apex .....
..... certain Australian *"Prosopis"*

Mandibles flattened at apex, not toothed..... 3

3. Mandibles not channelled, truncate at the apex, supraclypeal area not angulate between the bases of the

antennae (evenly rounded down to the sockets). .....
..... *Gnathoprosopis* Perkins

Mandibles channelled outwardly as in *Hylaeus,* rounded at apex, sides of supraclypeal area ridged or angulate between the antennae ..... *Gnathylaeus* n. gen.

4. Scutellum and metanotum normal.....*Hylaeus.* etc.

Scutellum and metanotum produced posteriorly on either side into a lateral laminate tooth or spine, superior face of propodeum areolate, separated from the posterior face by a carina, posterior face divided by a longitudinal carina, angulate and subcarinate at the sides, supraclypeal area narrowed above margined, clypeus higher than broad at apex, first and second cubital cells receiving the recurrent nervures near their apices.

♂ Apical narrow portion of stipes with black hairs. but little longer than the basal part, slightly exceeding the sagittae, eighth sternite produced into a rounded lamina as long as wide as its base, carinate medially.

Coloration black with yellow markings on the collar and in the ♂ upon the head and legs.....*Metylaeus* n. gen.

14. Nothylaeus. n. gen.

This genus so far is Ethiopian in its distribution. Several species previously described as species of *Prosopis* are referable here and three species from West Africa are here described, one of them so peculiar as to warrant the erection of a subgenus for its reception. Type *Prosopis heraldica* Smith.

Nothylaeus heraldicus (Smith).

Prosopis heraldica Smith. Cat. Hym. Brit. Mus. 1:35 ♀ Cope of Good Hope 1853.

This species was taken in numbers visiting the flowers of various species of *Aloe* in the botanical garden in Capetown.

Nothylaeus rufipedioides (Strand).

Prosopis rubriplagiata rufipedioides Strand.
Wiener Ent. Zeitsch. 30:135 ♂ Cape Aug. 1911.
Prosopis Junodi Friese
Archiv. Naturges. 77:131. Transvaal. 1911.

A few specimens of this species were taken with the previous species.

Nothylaeus Braunsi (Alfken).

Prosopis Braunsi Alken
Zeitschr. fr. Syst. Hym. Dipt. 5:147, Cape Colony 1905.

My thanks are due to Dr. L. Peringuey of the South African Museum for a male of this species, taken by Dr. Brauns at Willowmore.

The following species which I have not seen are, from the descriptions, apparently referable here:

Nothylaeus rubrifacialis (Strand).

Prosopis rubrifacialis Strand
Societas Entomologica 27:20 ♀ Togoland. Feb. 1912.

Nothylaeus sansibaricus (Strand.)

Prosopis sansibarica Strand.
loc. cit. 30 ♀ Zanzibar. Mch. 1912.

Nothylaeus nyassanus (Strand).

Prosopis nyassana Strand.
loc. cit. 33 ♀ L. Nyassa. Mch. 1912.

Nothylaeus binotatus (Alfken).

Prosopis binotata Alfken. Deutsch. Ent. Zeitsch. 1914:184 ♀ ♂ South Africa April 1914.

Nothylaeus Magrettii (Vachal).

Prosopis Magrettii Vachal. Bull. Soc. Ent. France 1892: cxxxv ♀. E. Sudan.

Nothylaeus gigas (Friese).

Prosopis gigas Friese. Archiv. f. Naturges. 77:132. ♀ Eritraea 1911.

To these may be added:

Nothylaeus Peringueyi n. sp.

♀ Black, mandibles, labrum, clypeus, suffusion on lower part of supraclypeal area, scape, flagellum beneath and anterior tibiae, knees and femora within ferruginous; lateral face marks acuminate and extending above the middle of the eyes and a dot on the tegulae yellow, legs piceous brown.

Collar, margin of tubercles and interrupted bands on the posterior margins of tergites 1 and 2 with white pubescence.

Clypeus, with the surface uneven, with rather fine shallow punctures distant from each other above twice their diameter, vertex more coarsely and closely and confluently punctate; mesonotum similar, the punctures more discrete, particularly discally; scutellum similar to the disc of the mesonotum, the surface shining; mesopleura more finely and closely punctured; sides of propodeum very finely longitudinally rugulose; above, the basal area is radiately rugulose and there is an inner semicircular enclosure bounded by a fine carina; posterior face of propodeum hexagonal, angulate laterally, radiately rugulose or striolate with the petiole as a center, surface like that of the sides of the propodeum, somewhat obscured by a microscopic appressed cinereous pubescence.

Abdominal tergites microscopically tranversely lineolate, impunctate, 1, 2, and 3 somewhat contracted apically; sternites 2 and 3 with fine scattered punctures.

Wings hyaline, the nervures blackish, first recurrent received near apex of first cubital cell, the second interstitial.

Length 5 mm. Length of wing 4.5 mm.

Described from a single ♀ collected at Oloke Meji, Ibadan, Nigeria, during August or September 1914 (J. C. Bridwell).

Type in the author's collection.

The species is named in appreciation of the opportunity of working for a time at the South African Museum and the kindly assistance afforded me by the director, Dr. L. Peringuey, whose comprehensive studies of South African entomology have made known many and interesting Coleoptera and Hymenoptera of South Africa and thrown much light on the biogeography of Africa, and whose administration has rendered the South African Museum one of the best of provincial museums.

making it an important factor in the development of the sciences of its region.

Nothylaeus yoruba n. sp.

♀ Black, opaque; mandibles, labrum, clypeus except middle line, antennae (flagellum darker above), pronotum (collar suffused with yellowish), legs including coxae, posterior interrupted band on scutellum, and basolateral suffusion on first tergite reddish; narrow longitudinal stripe on clypeus, acuminate mark on sides of face reaching 2/3 of the distance to the summit of the eyes, transverse mark on the supraclypeal area and basal spot on tegulae yellow; wings hyaline, venation blackish.

Rather generally covered with sparse, fine cinerous pubescence, noticeable on the antennal foveae, cheeks, collar, tubercles, mesopleura, sides of propodeum and second and following tergites; tergites 1 and 2 with apical interrupted hair bands.

Clypeus with the surface uneven with very shallow indefinite punctures separated from each other about their own diameter, sides of face and supraclypeal area much the same, a little more definitely punctured; vertex closely and confluently punctured. Mesonotum very closely, rather finely and confluently punctured, appearing granular or shagreened with a low-power lens. Scutellum with the surface somewhat shining, with a little coarser scattered punctures; metnotum knobbed, opaque, with irregularly disposed punctures. Propodeum with a few coarse reticulations at the base of the basal area not extending to the sides or summit but a few rugae there. Mesopleura like the mesonotum, sides of the propodeum with the finer sculpture concealed by the pubescence; posterior face of the propodeum hexagonal, radiately irregularly striolate, angulate.

Abdomen subopaque, tergites microscopically transversely lineolate; the apices of tergites 1-3 but very little contracted.

Described from a single ♀ collected at Oloke Meji, Ibadan, Nigeria, during August or September 1914 (J. C. Bridwell).

Type in the author's collection.

Yoruba, the nation of agricultural negroes occupying a great part of southern Nigeria.

14a. Anylaeus n. subgen. of Nothylaeus.

The bee described below, while agreeing with *Nothylaeus* in the characters drawn from the genital armature and the form of the concealed sternites and in the cephalic characters—labrum, mandibles and supraclypeal area, approaches *Metylaeus* in the peculiarities of the metanotum and scutellum. For the

present it may be referred to *Nothylaeus* but if the female is found to possess the same thoracic structure it may well be considered a genus. Type *Nothylaeus* (*Anylaeus*) *aberrans* Bridwell.

Nothylaeus (Anylaeus) aberrans n. sp.

♂ Black; basal spot on mandibles, spot on basal elevation of labrum, clypeus except upper margin, sides of face evenly narrowed to the eye a little above the antennal sockets, spot on supraclypeal area against the clypeus, obscure stripe on outer side of scape, spot on tubercles, spot on the dorsal one of the two free sclerites of wing base behind tegulae, posterior dot on either side the depression of the scutellum, small spot on base of front and middle tibiae, basal third of hind tibiae, and basitarsi outwardly whitish; rest of tarsi and anterior tibiae and calcaria pale, mandibles except base and flagellum beneath brownish, tegulae piceous, wings hyaline, a little smoky, venation brownish.

Cheeks and occiput with short, loose, scattered plumose hairs; collar posteriorly with a feeble band of plumosity; mesosternum with the surface concealed with erect short plumose pubescence, sides and posterior face of propodeum with fine appressed scattered pubescence but little concealing the sculpture; tergite one with interrupted whitish hair band, on posterior margin (abraded), the remaining tergites with very fine scattered whitish hairs, sternites similar, the last two visible sternites also with a few erect black hairs.

Surface of clypeus uneven, coarsely punctate with ill-defined punctures removed from each other a little more than their own diameter, face and lower part of supraclypeal area with a few similar punctures. Upper part of supraclypeal area, front and vertex very coarsely and confluently punctured, the surface somewhat shining. Supraclypeal area margined with curved carinae above, contracted below, the middle elevated from the contraction, the upper portion nearly in the same plane as the front, with a median low ridge extending to the anterior ocellus.

Collar margined anteriorly, subinterrupted medially, the lateral angles prominent but blunt. Mesonotum with exceedingly coarse unevenly distributed punctures of different magnitudes, the surface between somewhat shining and irregularly transversely striolate, the parapsidal and median furrows well defined, mesopleura evenly and coarsely punctured, the punctures separated by about their own diameter. Scutellum deformed, basally with a few punctures and longitudinally lineolate, posteriorly with a profound, rounded, shining excavation a little anterior to two similar postero-lateral excavations and separated from them by two acute edged carinae extending obliquely to the main plane of the scutellum, the posterior excavations are laterally (and partly dorsally) margined with a translucent almost membranous recurved chitinous process. Metanotum profoundly excavated and shining, bounded

laterally by strong recurved costate margins which are produced posteriorly nearly one-half the median length of the metanotum. Propodeum with the basal area coarsely areolate, the basolateral areas excavated and separated from the posterior face by strong carinae; sides shagreened; posterior face more coarsely so, hexagonal, bounded laterally by carinae, profoundly channeled in the middle. Abdomen impunctate above, transversely lineolate, a little shining, tergite 1 strongly contracted apically and 2 basally and apically; sternites similar to the tergites but with some fine scattered punctures. Head broader than thorax, broader than long, eyes strongly converging below, clypeus about as high as broad at apex. Thorax and abdomen rather slender. The first recurrent is received at the apex of the first cubital cell, while the second is interstitial.

The aedeagus very similar to that of *N. heraldicus, N. Braunsi*, and *N. rufipedioides*, agreeing with the latter on the gentle curve of the outer side of the stipes and in the greater expansion of the sagittae in the middle as contrasted with *heraldicus* and *Braunsi*.

The eighth sternite has the margins straight on either side the apical process, *rufipedioides* has them nearly so, while they are strongly sinuate in *heraldicus* and *Braunsi*.

Length 5.5 mm., wing 4.5 mm.

Described from one ♂ collected at Oloke Meji, Ibadan, Nigeria, Aug.-Sept. 1914 (J. C. Bridwell).

Type in the author's collection.

Nothylaeus (Anylaeus) dentiferellus (Strand).

Prosopis dentiferella Strand.
Soc. Ent. 27:30 ♂ Delagoa Bay. 1912.

By the description this species is similar to *aberrans* but the structure of the scutellum is different and the metanotum (postscutellum) is not described. Strand suggests the possibility of this being the ♂ of *Magrettii* (Vachal).

15. Metylaeus n. gen.

Type the following species.

Metylaeus cribratus n. sp.

♀ Black, mandibles rufous at apex, flagellum brownish beneath, abbreviated interrupted line on collar, tubercles, and a small spot on the knees of the front legs yellowish, wings hyaline, the nervures and stigma blackish.

Sides and posterior face of propodeum with the surface somewhat obscured by minute appressed scattered cinerous pubescence; first tergite with an apical interrupted band of white dense pubescence.

Surface opaque, microscopically lineolate between the coarse cribrate punctures of the head, thorax and first tergite. Punctures of the clypeus large shallow umbilicate, separated from each other a little less than their diameter, those of the face deeper and closer, the eyes are surrounded by a punctate furrow with finer punctures in front, distinctly margined, the margin continued to the level of the anterior ocellus. Eyes converging nearly one-half below, malar space nearly linear, clypeus a little higher than broad, supraclypeal area elevated, triangular, acuminate into a carina disappearing before it reaches the anterior ocellus.

Collar anteriorly carinate, subinterrupted in the middle; mesonotum coarsely, strongly and confluently punctured, parapsidal and median furrows indicated only as straight narrow lines. Tegulae with a few fine shallow punctures. Scutellum a little over 2/5 as long as wide, more sparsely punctured than the mesonotum, its posterior margin impressed on either side the middle and the lateral angle produced into a tooth. Metanotum elevated, impressed in front and behind so that an elevated rina alone connects the two sides, the posterior angles on either side end in a blunt tooth. Superior face of propodeum separated from the sides and posterior face by carinae, the posterior carina costate; the area bounded by a weak carina, the surface bears a few weak coarse wrinkles two of which more or less bound a small triangular inner area and continue after uniting to the posterior carina. Mesopleura more sparsely punctured than the mesonotum. Sides and posterior face of propodeum impunctate, finer sculpture not visible for the fine pubescence.

First tergite strongly punctate, the punctures more separated than on the mesonotum; the remaining tergites only very finely and indistinctly minutely punctured, none of the tergites very much contracted at apex. The first recurrent is received by the first cubital cell near its apex; the second is interstitial or received a little before the second transverse cubitus.

♂ Resembles the female, but the sculpture particularly of the propodeum is somewhat coarser. The teeth of the scutellum and metanotum are more produced, those of the metanotum becoming long spines more than half as long as the distance between them. The second tergite is rather strongly but much more finely punctured than the first and both are strongly contracted at apex.

The markings of the collar are reduced, a triangular yellow spot with the apex down lies beneath the antennae and against the margin of the supraclypeal area and the clypeus but does not touch the orbit, anterior tibiae and tarsi outwardly with a pale stripe.

The discussion of the genitalia given under the genus applies to this species.

Length 4.5--5 mm., wing 5 mm. Some males smaller.

Described from 24 ♀ 14 ♂ collected in August and September 1914 at Oloke Meji, Ibadan, Nigeria (J. C. Bridwell).

Type ♂, allotype and paratypes in the author's collection. paratypes in the collection of the Hawaiian Board of Agriculture and Forestry.

From the descriptions two previously described species belong to this genus:

Metylaeus catalaucoides new name.

Prosopis Bouyssoui Vachal.

Ann. Soc. Ent. France 68:565 ♂ (*nec* ♀) N'Doro 1899.

Metylaeus scutispina (Alfken).

Prosopis scutispina Alfken

Deutsch. Ent. Zeitsch. 1914:195 ♂. Rhodesia.

The former species appears to differ from *cribratus* by the shorter (triangular) metanotal spine and the presence of a yellow spot on the supraclypeal area, *M. scutispina* differs by the red mandibles, labrum, and anterior edge of the clypeus, the rest of the clypeus being yellow. The sculpture of the second tergite in the description is not indicated as different from that of the first.

16. Gnathylaeus n. gen.

The single species described under this genus resembles very closely the male later described as *Hylaeus* (*Nesylaeus*) *nesoprosopoides* and the material from which they were described was taken together. The mandibles of the two are, however, wholly unlike and I have never seen a sexual dimorphism in the family Hylaeidae which would parallel this. The first tergite is different in the two species but not more so than in some *Hylaeus*. I do not, however, believe they belong to the same species.

It will be interesting to examine more material and the generic characters can no doubt be amplified when the male

genitalia can be examined. The genus is nearer *Hylaeus* than to *Gnathoprosopis* but seems sufficiently distinct from either.

The propodeum, supraclypeal area and other characters are apparently as in *Hylaeus*. Type the following species.

Gnathylaeus Williamsi n. sp.

♀ Black; heavy inverted T-shaped mark on clypeus, sides of face to antennae and from there narrowed to the orbits, collar interrupted medially, tubercles, basal internal spot on tegulae, external basal stripe on anterior and middle tibiae and basal half of hind tibiae sulfur yellow; calcaria whitish, apex of mandibles, flagellum beneath and tarsi brownish; wings hyaline, neuration of front wings blackish, of hind wings pale.

Surface of propodeum except the basal area somewhat concealed by fine scattered cinereous appressed pubescence, hind margins of first tergite with a widely interrupted white hair band, second and third tergites with similar hair bands, evident only in certain lights.

Clypeus longitudinally microscopically lineolate and with rather coarse well-separated punctures. Front and vertex closely and confluently punctured. Mesonotum much the same, punctures of scutellum well separated, metanotum shagreened, area of propodeum rugose-shagreened, mesopleura much as the mesonotum.

Abdomen with tergite 1 highly polished and shining with a few shallow minute scattered punctures, second and following tergites less shining with minute shallow punctures distant from each other two or three times their diameters; tergites 1-3 but very little contracted; sternites a little more coarsely punctured.

Length about 6 mm.; wing 4.5 mm.

Described from two ♀ collected at Los Banos, Luzon, Philippine Islands (F. X. Williams).

Type and paratype in the author's collection.

17. Nesoprosopis Perkins.

Dr. Perkins has described a species from China as *Nesoprosopis chinensis*. I have a male which is strictly congeneric with this from the Philippine Islands and I am convinced that these species should be separated from *Nesoprosopis*. This and the new species are referred to a subgenus of *Hylaeus* which I call *Nesylaeus*, since I can find no character to separate these species from *Hylaeus* except the male genitalia.

Nesoprosopis was separated by Dr. Perkins largely on the character of the eight sternite of the ♂ and this does not seem to me to be so strongly different from some species still remaining in the old genus *Prosopis*.

He supplements this character by the lack of enclosure of the basal area of the propodeum. Most of the species have absolutely no clear line bounding this area. However the area is clearly defined in some of the species such as *N. fuscipennis* (Smith) and *N. pubescens* Perkins.

I am inclined in studying the Hylaeidae to give considerable importance to the structure of the supraclypeal area and its extension above between the antennae. While frequently it is not easy to describe this structure, it seems to be very characteristic in the different groups. In this character *Nesoprosopis* differs from *Hylaeus* in the more limited sense which I should use it. In *Nesoprosopis* this area is convex between the antennae and narrowed, rounding down at the sides to the rest of the surface without angles, ridges or carinae; it is also not narrowed in the middle nor expanded and elevated at its summit, but is sub-triangular in form, and with a fine shallow channel leading from near its summit near to the anterior ocellus.

The sides of the propodeum are separated from the posterior face by a sharp angle not rounded off nor on the other hand surrounded by carinae as in many species described as *Prosopis*. This structure is identical with that of typical *Hylaeus*.

18. Hylaeus Fabricius (Latreille emend).

The species of Europe and North America described mainly as *Prosopis* may perhaps some of them be broken off into separate subgenera but generally speaking, those which I have seen seem congeneric. I have not been able to examine many of the European species, but those which I have do not seem readily separable. Generally speaking the species show little differentiation in the character of the edeagus. More variation

exists in the structure of the seventh and eighth sternites but these differences do not seem significant enough to form generic divisions upon. There are, however, differences in the form of the supraclypeal area, of the collar and of the propodeum which may on further study be found to supplement the genital characters. Thus the Boreal American *Hylaeus basalis* (Smith) may well be isolated since there are differences there in bodily structure in addition to the genital characters. On the other hand *Hylaeus pictus* (Smith) of which I have seen specimens from Malaga, while differing greatly in coloration and appearance from other European and the North American species, does not appear to have either genital or somatic characters warranting its removal from the genus *Hylaeus*. While time and the material at my disposal has limited my examination to about thirty Australian species I have not seen any species which seems assuredly referable to *Hylaeus*, tho some seem close to that genus. An interesting color group there is that of the black species with the scutellum and metanotum yellow, which by the examination of the genitalia and somatic structures would fall into about four distinct genera, with ample characters for their separation. From Africa I have seen several species in the group of *Hylaeus curvicarinatus* (Cameron) which are clearly *Hylaeus* but they have excellent group characters which I have considered warrant the erection for them of the subgenus *Deranchylaeus*. Some Japanese species are here described which some of them seem typical, while two of these species are more divergent. I have unfortunately not seen any of the neotropical species.

19. Deranchylaeus n. subgen. of Hylaeus.

In my travels in Africa in 1914 and 1915 besides the species here separated in the genera *Metylaeus* and *Nothylaeus* I found nine species of *Hylaeus* falling into a compact group differing from all other species of *Hylaeus* which I have seen by the supraclypeal area being bounded laterally by two fine outwardly curved carinae and not at all declivous above. The

collar is also broader than usual and is often acute or carinated in front, never subinterrupted. The males have the sides of the seventh sternite with long teeth or spines much as in the *Cressoni* group of North America but the eighth sternite is never bilobate or expanded at apex. The edeagus is ordinary in form for *Hylaeus*. This group is Ethiopian so far as my knowledge goes. Type *Prosopis curvicarinata* Cameron.

The following table will serve to distinguish the species of *Deranchylaeus* collected in Africa during 1914 and 1915 and the notes and bibliography may assist in the study of the group. With the species treated under *Metylaeus* and *Nothylaeus,* it is designed to include in the present treatment all Ethiopian Hylaeidae so far known.

Females.

1. First tergite distinctly punctate, the punctures nearly as large as those of the mesonotum 2
   First tergite impunctate or with very minute punctures 5
2. Clypeus not impressed.....*immarginatus*
   Clypeus impressed subapically..... 3
3. Impression of clypeus not definitely limited above. Mark on the face opposite the base of the antennae narrowed below, subinterrupted line on the collar, spot on the base of the tegulae and on the tubercles whitish ..... *Drègei*
   Impression of clypeus transverse well defined, collar and tubercles dark, knees more or less pale..... 4
4. Clypeus medially subtuberculate above the impression, basal one fifth of hind tibiae pale outwardly....*Haygoodi*
   Clypeus not subtuberculate above the impression; hind knees and tibiae entirely dark.....*Lightfooti*
5. Propodeum with the basolateral areas separated from the posterior face by a carina..... 6
   Propodeum with the basolateral areas not separated from the posterior face 7
6. Mandibles, clypeus, supraclypeal area below, lower

angles of sides of face and flagellum ferruginous ..... *xanthostoma*

Flagellum darker, face entirely dark..... .....*longulus*

7. Inner orbits with a very small whitish spot a little above the antennal sockets.....*curvicarinatus*

Inner orbits with a white line reaching much above the antennal sockets ..... *bequaertianus*

Males

1. Apical lobe of 7th sternite hornlike, 1st tergite not strongly punctured 2

Apical lobe of 7th sternite flaplike..... 3

2. 1st tergite microscopically distinctly and evenly sparsely punctured, yellow mark on sides of face contiguous with the eyemargins above... *curvicarinatus*

1st tergite not distinctly punctured, white marks of sides of face curving over base of antennae..... ..... *bequaertianus*

3. Seventh sternite with the lateral teeth strongly developed, first tergite distinctly and strongly punctate.... 4

Seventh sternite with the teeth feebly developed, first tergite not distinctly punctate..... .....*longulus*

4. Basal area of propodeum not differentiated from the basolateral areas, stipites rounded at apex, not obliquely truncate outwardly 5

Basal area of propodeum strongly differentiated from the basolateral areas, the latter strongly and distinctly punctate, stipites acute at apex obliquely truncate outwardly ..... *immarginatus*

5. Basal area longitudinally rugose, apical process of 8th sternite acute nearly as long as the width, on either side, of the basal part, clypeus shallowly impressed over most of its surface..... .....*Drègei*

Basal area vermiculate and confusedly closely rugulose, process of 8th sternite short, blunt, less than half the width on either side, clypeus convex.....*Lightfooti*

Hylaeus (Deranchylaeus) albonasatus (Strand).

Prosopis albonasata Strand. Soc. Ent. 27:30 ♂ South Africa 1912.

Has a semilunar carina on the third sternite.

Hylaeus (Deranchylaeus) Alfkeni (Friese).

Prosopis Alfkeni Friese.
Zool. Jahrb. Abt. Syst. 35:583 ♂ Rhodesia. 1913.

♀ Pronotum, mesonotum, and apices of tergites 1-3 fringed with white pubescence, face black, 1st and 2d tergites very densely and coarsely punctured.

♂ Similar, scape black, not widened above.

Hylaeus (Deranchylaeus) Arnoldi (Friese).

Prosopis arnoldi Friese. Zool. Jahrb. Abt. Syst. 35:584 ♂ Rhodesia. 1913.

Prosopis xanthopus Alfken.
Deutsch. Ent. Zeitschrift. 1914:197 ♀ Rhodesia.

Alfken gives no reason for separating his species from Friese's from the same locality. The differences appear to be merely sexual.

A coarsely sculptured species with the mandibles, labrum, clypeus, legs and antennae red. Differs from *xanthostoma* by the red legs, those of *xanthostoma* being black.

Hylaeus (Deranchylaeus) aterrimus (Friese).

Prosopis aterrima Friese.
Arch. Naturges. 77:129 ♀ Transvaal 1911.
Prosopis quinquedentata Friese. l.c. 132 ♂ Transvaal.
Prosopis aterrima Alfken.
Deutsch. Ent. Zeitschr. 1914:189 ♀ ♂.

♀ Resembles *immarginatus* but the clypeus has a yellow median line and the lateral face marks are broadened within near the middle.

♂ Clypeus with a yellow median line.

Hylaeus (Deranchylaeus) atriceps (Friese).

Prosopis atriceps Friese.
Arch. Naturges. 77:130 ♀ Transvaal 1911.
Prosopis atriceps Alfken.
Deutsch. Ent. Zeitschr. 1914:187 ♀ (nec ♂).

The male described as *atriceps* ♂ by Alfken is certainly the same as one taken by me at Capetown but the female I have associated with it is not *atriceps* Friese but *tenuis* Alfken. Probably *atriceps* is a distinct species with a more northern distribution. The Capetown species I believe to be *curvicarinatus* (Cameron).

Hylaeus (Denrachylaeus) bequaertianus n. sp.

♀ This species is very like *curvicarinatus* but differs by the characters given in the table, a whitish line extending along the inner orbits to the lower end of the supraorbital foveae. The microscopic punctures of the first tergite are exceedingly shallow and hardly to be distinguished even with a binocular.

♂ The male has the pale coloration whitish rather than yellow and the face marks are curved away from the eye margin over the antennal sockets and in none of the individuals studied is there a trace of a light mark on the supraclypeal area. The apices of all the tibiae are pale while the pale band on the base of the hind tibia is reduced, otherwise practically like *curvicarinatus*.

The genitalia of this species and of *curvicarinatus* are practically alike and the description of this species will serve for both, the differences being pointed out.

Edeagus with the stipites rounded at apex extending to the tips of the sagittae, with a few stout straight acuminate hairs at apex, basal part about as long as the narrow apical part.

Eighth sternite with the apical process truncate at apex; about as long as the width, on either side, of the basal part, the basal part is produced somewhat into a rounded lobe on either side. In *curvicarinatus* the process is a little shorter and rounded at apex.

Seventh sternite with a basal and apical lobe on either side, the apical lobe is chitinous and hornlike but a little compressed, the basal lobe is a little shorter but little chitinized and a little strap-shaped bearing a few long spines or teeth on its anterior margin. In *curvicarinatus* the apical lobe is shorter, less compressed and more hornlike, while the basal lobe is shorter and more rounded and the teeth much feebler, the sinus between the two lobes being conspicuous in *bequaertianus* and hardly perceptible in *curvicarinatus*.

Five ♀ ♀ and seven ♂ ♂ collected at Oloke Meji, Ibadan, Nigeria, Aug.-Sept. 1914 (Bridwell).

Type ♂, allotype and paratypes in the author's collection.

Named in honor of Dr. Joseph Bequaert of the American Museum of Natural History, whose recent work on the Ethiopian Vespidae is an example of what systematic work at its best may be.

Hylaeus (Deranchylaeus) Bouyssoui (Vachal).

Prosopis bouyssoui Vachal. Ann. Soc. Ent. France 68:535 ♀ (*nec* ♂). N'Doro 1899.

Hylaeus (Deranchylaeus) capicola (Alfken).

Prosopis capicola Alfken.
Deutsch. Ent. Zeitschr. 1914 ♀ Algoa Bay, So. Afr.

Differs from *longulus* by the finer puncturing of the head, the shorter supraorbital fovea, the short yellow line on the clypeus, the yellow line on the pronotum, spot on tubercles and finer puncturing of the thorax.

Hylaeus (Deranchylaeus) curvicarinatus (Cameron).

Prosopis curvicarinata Cameron. Trans. So. Afr. Phil. Soc. 15:236 ♂ Pearston, Cape Colony 1905.

?*Prosopis robertiana* Cameron.
Trans. So. Afr. Phil. Soc. 16:325 ♂ Pearston, Cape Colony 1906.

Prosopis atriceps Alfken (nec Friese).
Deutsch. Ent. Zeitschr. 1914:188 ♂ (*nec* ♀) Port Elizabeth, Cape Colony, So. Afr.

Prosopis tenuis Alfken.
l.c. 188 ♀ (♂ ?) Algoa Bay, So. Afr.

I have 16 ♀ ♀ and 22 ♂ ♂ which were determined at the South African Museum as *atriceps*. The sexes were associated by breeding them from nests in twigs like those of the European and North American species. After a careful study of the description I find that the female corresponds more closely

with the description of *tenuis* though there are definite strong hair patches on the lateral margins of tergites 1-3 and the length is 5 mm. or a little more. The male agrees well with the ♂ described as the ♂ of *atriceps*. Some of the males have the supraclypeal area dark except a narrow line along the anterior margin. These are similar to the male described as *tenuis* ♂ and belong with the others as proved by the study of the genitalia. After carefully reading Cameron's descriptions of *Prosopis curvicarinata* and *robertiana* I am inclined to believe that both of them refer to the same species and that the material compared as *curvicarinata* with *robertiana* was some other species. The species is apparently the same as *tenuis* Alfken, but only the examination of the types could remove all uncertainty—if it could be ascertained which is Cameron's true type.

The differences of venation mentioned by Cameron are of no importance since I have found the same difference in the venation of males of this species ascertained to be the same by the examination of the genitalia.

Hylaeus (Deranchylaeus) Dregei (Strand).

Prosopis drègei Strand.
Soc. Ent. 27:27 ♂ Cape Colony, So. Afr. 1912.

The ♀ previously undescribed is perhaps sufficiently differentiated in the table. The 1st and 2nd tergites bear apical lateral white hair patches. Length 6 mm.; wing 4.5 mm.

♂ Seventh sternite with the lateral spines very strongly developed on the sides of the middle piece and the posterior (apical) margin of the basal lobes, the apical lobes flaplike, elongate, membraneous.

Median process of 8th sternite elongate (somewhat similar that of *Hylaeus nipponicus* but not so acute nor so strongly chitinized), about as long as the width of the basal part on either side. The sides of the basal part in a straight line with each other.

Edeagus with the stipites about as long as the sagittae.

One ♀ and 2 ♂ ♂ collected at Cape Town, Jan.-Apr. 1915 (Bridwell).

Hylaeus (Deranchylaeus) flaviscutum (Alfken).

Prosopis flaviscutum Alfken.

Deutsch. Ent. Zeitschr. 1914:193 ♀ ♂ Cape 1914.

♀ Differs from *immarginatus* in having tergites 1-3 with fine white apical hair bands.

♂ The male has the scape not expanded above.

Hylaeus (Deranchylaeus) gabonicus (Vachal).

Prosopis gabonica Vachal.

Ann. Soc. Ent. France 68:536 ♀ W. Afr. 1899; *Op. Cit.* 72:400 ♂ W. Afr. 1903.

The description of the female is not entirely adequate; the basolateral areas of the propodeum are said to be discrete from the declivity "vix modico jugo" and the wings infuscate, otherwise the species would seem to resemble *bequaertianus* rather closely.

The male is described as having the apex only of the clypeus yellow.

Hylaeus (Deranchylaeus) Gaullei (Vachal).

Prosopis Gaullei Vachal.

Ann. Soc. Ent. France 68:536 ♀ W. Afr. 1899.

Differs from *Drègei* by having two long sulculi on the clypeus and the metanotum with two minute tubercles.

Hylaeus (Deranchylaeus) Haygoodi n. sp.

Dregei, Haygoodi, and *Lightfooti* form a closely related group to which probably *Gaullei* also belongs in which the anterior portion of the clypeus is impressed, the first tergite is strongly punctate and the second more finely so, the first tergite has white apical lateral hair patches and the second more feeble ones. The basal area of the propodeum is vermiculate rugose in *Dregei* and *Haygoodi* and more feebly reticulate in *Lightfooti,* in no case strongly defined, the basolateral areas which are not discrete are strongly punctured. In *Haygoodi* the punctures of the 1st and 2nd tergites are stronger and coarser, and less different on the two segments than in the other species. Otherwise I have nothing to add to the characters given in the table.

Described from 1 ♀ collected at Cape Town, Jan.-Apr. 1915 (Bridwell).

Type in the author's collection.

Named in honor of Mr. Haygood, American vice-consul at Cape Town, who in addition to his official duties adds to the enjoyment of Americans in Cape Town by his kindly offices in giving opportunities to enjoy the mountains and their life, in appreciation of courtesies received and help given.

Hylaeus (Deranchylaeus) immarginatus (Alfken).

Prosopis immarginata Alfken.

Deutsch. Ent. Zeitschr. 1914:187 ♀ Algoa Bay, So. Afr.

The ♂ hitherto undescribed has the clypeus except a narrow band along the anterior margin, a triangular spot on the sides of the face filling them to near the summit of the clypeus, from there narrowed to a narrowly extended point on the eyemargin about even with the lower edge of the antennal sockets, spot on the outer base of rfont tibiae calcaria, middle and hind basitarsi except at apex whitish, anterior side of anterior tibiae sordid yellowish, flagellum light brownish beneath.

Scape suddenly expanded at about half its length from the base on the outer side to about twice its width at base.

Seventh sternite similar to that of *Dregei* but the apical lobes shorter, the basal lobes with the apical edges not straight and the teeth sronger and crooked.

Eighth sternite with the apical process short, acute, and about one-half the length of the distance, on either side, of the basal part.

Two ♀ ♀ and seven ♂ ♂ collected at Cape Town Jan.-Apr. 1915 Bridwell.

Hylaeus (Deranchylaeus) krebsianus (Strand).

Prosopis krebsiana Strand.

Soc. Ent. 27:33 ♀ Cape Colony 1912.

Resembles *immarginatus* Alfken but differs by the structure of the clypeus. From the species with the clypeus impressed, *Drègei, Lightfooti,* and *Haygoodi,* it differs by the long whitish line along the orbits.

Hylaeus (Deranchylaeus) leucolippa (Friese).

Prosopis leucolippa Friese.

Deutsch. Ent. Zeitschr. 1913:574 ♂.

Zool. Jahrb. Abt. Syst. 35:582 ♂ German South West Africa 1913.

This species agrees with *longulus* in having the labrum and mandibles yellow in the male but the first tergite is strongly punctured. Possibly this is the male of *Bouyssoui*, the male described as such being a *Metylaeus*.

Hylaeus (Deranchylaeus) Lightfooti n. sp.

♀ The characters of the female and its differences from the related species are brought out in the table and in the discussion of *H. Haygoodi*.

Length 6 mm.; wing 4.5 mm.

♂ Resembles the ♂ of *immarginatus* but has the 1st and 2nd tergites much more finely punctured. The lateral face marks extend above the antennal sockets, being narrowed from the supraclypeal area or just beneath the antennal sockets, the supraclypeal area has a white transverse mark at its apex, large spot on tegulae, anterior tibiae outwardly, all the tarsi except the somewhat darkened tips, middle tibiae slightly outwardly at base and apex and basal half (nearly) of hind tibiae whitish yellow; flagellum beneath pale brown, anterior tibiae pale brownish in front.

Scape strongly punctured evenly broadened from the base, nearly twice as broad at apex as the pedicel.

Length 5.5 mm.; wing 4.5 mm.

One ♀ and one ♂ collected at Cape Town Jan.-Apr. 1915 (Bridwell). Type and paratype in the author's collection.

Named for Mr. Lightfoot, assistant in the South African Museum, who has collected many interesting South African insects.

Hylaeus (Deranchylaeus) lineaticeps (Friese).

Prosopis lineaticeps Friese.

Deutsch. Ent. Zeitschr. 1913:573 ♀ Cape Colony.

Zool. Jahrb. Abt. Syst. 35:582 ♀. 1913.

Prosopis lineaticeps Alfken.

Deutsch. Ent. Zeitsch. 1914:190 ♀ ♂ Cape Colony, Natal.

Similar to *Drègei* but there are two narrow furrows leading

from the impression of the clypeus, and the eyes do not converge below.

♂ Has only the first tergite with lateral hair patches and the 3d and 4th sternites have more or less distinct tubercles.

Hylaeus (Deranchylaeus) longulus (Friese).

Prosopis longula Friese.

Deutsch. Ent. Zeitschr. 1913:574 ♂ Rhodesia.

Zool. Jahrb. Abt. Syst. 35:583 ♂. 1913.

Prosopis longula Alfken.

Deutsch. Ent. Zeitschr. 1914:192 ♂ Rhodesia.

The ♀ has not been hitherto described.

♀ Black; anterior knees and tibiae in front and spot on tegulae yellow, flagellum light brown beneath, tarsi a little brownish, wings hyaline, the nervures brown.

Head a little longer than broad, the eyes converging below; clypeus, lower portion of supraclypeal space and sides of face longitudinally lineolate with very shallow rather coarse punctures separated by less than their diameter, those on the sdies of the face coarser and more distinct; genae longitudinally lineolate with 4 series of large shallow umbilicate punctures, front much more strongly punctate, the punctures seriate along the orbits, interstices tessellate; vertex unevently punctate the punctures along the occiput confluent; sulcate longitudinal carina of he middle of supraclypeal area not strong but approaching the anterior ocellus, supraorbital fovea reaching the level of the summit of teh eye.

Collar with the anterior margin acutely carinate, a median hair patch on its surface, anterior angles acutely subdentate, the surface uneven very minutely tessellate but impunctate mesonotum with strong deeply impressed coarse punctures confluent anteriorly, from the anterior third posteriorly, the punctures discrete, separated by their own diameter or more interstices strongly tessellate, scutelum similar, metanotum contrasting, the punctures coarser and closer, the tessellation of the interstices stronger; mesopleura similar to the mesonotum. Basal and basolateral areas of propodeum discrete, separated from the posterior face by a strong carina. Basal area with some reticulate pits anteriorly limited by an irregular carina, the rest and the basolateral areas coarsely irregularly reticulate, the surface tessellate, shining. Sides of propodeum opaquely tessellate, finely, strongly and closely punctate, separated from the basolateral and posterior areas by carinae, the posterior face rather coarsely reticulate, the furrow rather narrow and definitely marked.

Tergites transversely lineolate tessellate, the first microscopically sparsely shallowly punctate, appearing impunctate with a hand lens.

Tergite 1 apically and 2 basally and apically a little contracted; sternites similar but distinctly irregularly finely and sparsely punctate.

Pubescence noticeable only on sides of pronotum, middle of collar, lateral apical hair patches on tergite 1, emargination of sternite 5, apical silvery patches on outer tips of the tibiae and a basal one on hind tibiae, and the tarsi.

First recurrent received by 1st cubital cell, second interstitial.

Length 5.5 mm.; wing 4 mm.

♂ Stipites acute, extending beyond the sagittae; 8th sternite with the apical process V-shaped, the sides not produced; 7th sternite with he teeth rather feeble but long, the apical lobe long and strap-shaped, much longer than the basal.

Two ♀ ♀ and two ♂ ♂ collected at Oloke Meji, Ibadan, Nigeria, Aug.-Sept. 1914 (Bridwell).

The ♀ differs from *Bouyssoui* Vachal in the mesonotum being not longitudinally impressed, the collar black, and the first tergite practically impunctate.

Hylaeus (Deranchylaeus) rugipunctus Alfken.

Prosopis rugipuncta Alfken.

Deutsch. Ent. Zeitschr. 1914:192 ♀ ♂ Cape Colony.

♀ Differs from *immarginata* in the yellow collar and coarser puncturing of the abdomen and the basal area of the propodeum is margined behind.

♂ Has the supraclypeal area black, scape not widened.

Hylaeus (Deranchylaeus) xanthostoma (Alfken).

Prosopis xanthostoma Alfken.

Deutsch. Ent. Zeitschr. 1914:196 ♀ ♂ South Africa, Belgian Congo.

One ♀ Oloke Meji, Ibadan, Nigeria, Aug.-Sept. 1914 (Bridwell).

20. Nesylaeus n. subgen. of Hylaeus.

The species which is described below is so similar in form and general structure to the species of *Hylaeus* that I can find no external structure distinguishing it. It has, however, the eighth sternite bearing an apical process similar to that of

Nesoprosopis anthracina Smith but somewhat more slender and a little less erect in its origin from the basal plate of the sternite. The edeagus, however, has the stipes greatly elongate and attenuate as described in the genus *Nothylaeus*. The basal area of the propodeum is undefined with a few transverse weak and indefinite rugae. Type *Hylaeus* (*Nesylaeus*) *nesoprosopoides* Bridwell.

Hylaeus (Nesylaeus) nesoprosopoides n. sp.

♂ Black, spot on anterior basal margin of mandibles, spot on labrum, clypeus except anterior and fine upper lateral margins, sides of face narrowed at the antennal sockets and above them rounded off to the eye, spot on the supraclypeal area, obsolescent spot on base of scape, line on the collar narrowed inwardly and interrupted, tubercles, basal half of tegulae, anterior knees and tibiae outwardly, large spot on base of middle tibiae, basal half of hind tibiae, basitarsi and second joints of tarsi yellow; calcaria pale; tarsi brownish beyond second joint; flagellum not perceptibly paler beneath; wings hyaline, the nervures brownish.

Cheeks, occiput and mesopleura with fine scattered, pale hairs, collar feebly pubescent behind, mesonotum with fine, evenly placed, sparse yellowish hairs, sides of propodeum and its posterior face with the surface more or less concealed by fine rather close appressed plumose pubescence. First and second tergite with interrupted white hair bands on the apical margins. Second and following tergites with scattered decumbent fine, dark hairs.

Clypeus except at apex, supraclypeal area, and sides of face longitudinally lineolate and sparsely punctured, front and vertex strongly and very densely punctured with moderate subconfluent punctures, the surface somewhat shining. Mesonotum similarly punctured, the punctures a little more separated, the surface duller, microscopically tessellate; mesopleura similar; scutellum similar bu the punctures coarser, unevenly spaced and removed from each other by more than their own diameter, mesonotum similar but the punctures very shallow; area of propodeum entirely indefinite, shining, with a few indefinite, irregular transverse rugae,rounded evenly down to the posterior face which has a deep longitudinal median sulcus, carinate laterally, some shallow oblique punctures are visible above the pubescence, and surface pubescent below apparently above the pubescence, and surface where it is pubescent is apparently rather densely punctured.

First tergite highly polished and shining, almost impunctate medially laterally rather closely and strongly punctured, second tergite rather evenly and strongly though finely punctured, the surface duller as are the remaining tergites, second tergite contracted apically and basally, the third apically, the sternites shining and sparsely shallowly punctured.

A compact species, the head as broad as the thorax, about as broad as long, eyes strongly convergent below, scape not strongly dilated, arched on the side next the head. Pronotum with the collar rounded, narrowed and subintrrupted medially, the angles not prominent. First recurrent received by the first cubital cell near its apex, the second interstitial or nearly so.

Length 5.5 mm.; wing 4.5 mm.

Described from one ♂ collected in 1917 at Los Banos, Philippine Islands (F. X. Williams).

Type in the author's collection.

Hylaeus (Nesylaeus) chinensis (Perkins).

Nesoprosopis chinensis Perkins.

Trans. Ent. Soc. Lond. 1911:725 ♂. China.

21. Japanese Hylaeus.

Frederick Smith described two species of the genus from Japan under the names of *Prosopis floralis* and *Prosopis perforata* (Tr. Ent. Soc. Lond. 1873:199) and Vachal one *Prosopis globula* (Bull. Mus. Hist. Nat. Paris 9:132, 1893). *Hylaeus floralis* (Smith) by the description closely resembles the species described below as *Hylaeus gnathylaeoides* but differs in slight details of coloration of the legs and in the coloration of the wing veins. I should, however, consider my species the same except for the different male which I associate with these females. *H. floralis* is described from Hiogo on the southern coast while *H. gnathylaeoides* comes from the mountains of the interior. *Hylaeus perforatus* is said to differ from *floralis* in having the head longer and the clypeus with only the anterior margin pale and the truncation of the propodeum abrupt with the margins somewhat raised. I have not been able to consult the description of *Hylaeus globulus* (Vachal) and do not know if it is identical with one of the following species. *Prosopis Miyakei* Matsumura from the island of Sakhalien, from the description, (Jour. Coll. Agr. Sapporo 4:108, 1911) is not a *Hylaeus* but probably belongs to the Halictidae, perhaps to *Evylaeus* Robertson.

Mr. Frederick Muir has collected the species which are now described. These may be tabulated as follows:

FEMALES.

1. With some yellow coloration, head not elongate, area of propodeum rather coarsely rugose only in one species smooth apically ---------- 2
   Entirely without yellow coloration, head somewhat elongate ---------- *Hylaeus niger*
2. Sides of face more or less yellow, posterior face of propodeum not surrounded by strong carinae---------- 3
   Head entirely black, propodeum with the posterior face surrounded by strong carinae except where the basal area rounded by strong carinae except where the basal area extends over upon the declivity---------- *Hylaeus nipponicus*
3. Clypeus without yellow markings, supraclypeal area not contracted in the middle and expanded and furrowed above 4
   Clypeus with a median longitudinal mark, supraclypeal area slightly contracted in the middle, a little expanded and strongly elevated and channeled above---------- *Hylaeus gnathylaeoides*
4. Edge of collar rounded, the pubescence on its posterior face rather feeble ---------- 5
   Edge of collar subcarinate, acute, the pubescence on its posterior face relatively strong and plumose---------- *Hylaeus Matsumurai*
5. Smaller species (5 mm.); lateral face marks in a line along the orbits; tegulae with a yellow spot; collar more narrowed medially; punctures of mesonotum shallower---------- *Hylaeus paulus*
   Larger species (7 mm.); lateral face marks triangular, tegulae black; punctures of mesonotum closer and deeper ---------- *Hylaeus monticola*

MALES.

1. Third sternite simple ---------- 2
   Third sternite with a spine on either side the disc connected by a ridge---------- *Hylaeus gnathylaeoides*
2. Scape not greatly widened ---------- 3
   Scape broader than long, about five times as wide as the pedicel ---------- *Hylaeus nipponicus*
3. Supraclypeal area entirely, stripe on scape, small spot on tubercles, etc., yellow, apical lobe of seventh sternite more feebly developed---------- *Hylaeus monticola*
   Supraclypeal area except margins, scape and tubercles dark, apical lobe of seventh sternite more strongly developed ---------- *Hylaeus* sp.

Hylaeus niger n. sp.

♀ Entirely without yellow coloration, black, calcaria pale, tarsi brownish. Head elongate. Clypeus and sides of face longitudinally lineolate with sparse shallow punctures, vertex more densely, deeply and finely punctured; mesonotum more finely punctate; mesopleura a little shining more sparsely punctate, scutellum a little shining, sparsely punctured; metanotum with the area rough chartaceous basally, smooth and shining apically, sides and posterior face very shallowly punctate.

Tergites rather highly polished but not very highly shining, the minute pilosity somewhat obscuring the reflections. Tergites not contracted, only a very faint trace of apical hair bands. Sternites transversely lineolate with irregular minute punctures from which the hairs arise.

Wings subhyaline, neuration brownish, recurrent nervures interstitial.

Form slender, abdomen elongate, eyes slightly converging below, collar rounded above, not narrowed or sub-interrupted in the middle, supraclypeal area contracted in the middle, expanded and elevated above and bearing a sulcus which continues a short distance on the front.

Length 7 mm.; wing 5 mm.

Described from two ♀ collected at Chiuzenji (4000-5000 ft.) July-August 1913.

Type and paratype in the author's collection.

Hylaeus nipponicus n. sp.

♀ Head entirely black. Propodeum with the basal area well defined coarsely irregularly reticulately, the posterior face bounded by carinae except where the apex of the area extends over upon it, basolateral areas well defined by carinae.

Black; spot on tubercles, one on the tegulae, front and middle knees and basal half of hind tibiae yellow, calcaria pale, flagellum brownish red beneath, wings brownish hyaline, the nervures brownish.

Clypeus with the surface opaque irregularly longitudinally lineolate with faint, shallow scattered punctures, supraclypeal area similarly but more regularly lineolate, sides of face similar but the lineolations increased to striations against the eyes; vertex and front somewhat shining strongly and discretely punctate; occiput transversely lincolate or striate; mesonotum similar to the front, the parapsidal and median lines well indicated but not impressed; scutellum similar; mesopleura similarly but more coarsely punctured, somewhat striate above; sides and posterior face of propodeum chartaceous or finely rugulose.

First tergite highly polished and shining with a few widely scattered, minute punctures, the remaining tergites less highly polished and the reflections broken by the minute pubescence; tergites 1-3 but very little contracted; sternites transversely lineolate, more definitely punctured.

A short, compact species, the head short, eyes not very strongly convergent below, supraclypeal area, a little contracted medially, expanded and elevated above, bearing a fine furrow which extends over the front to the anterior ocellus. Collar acute in front, narrowed or subinterrupted in the middle. The recurrent nervures interstitial or nearly so.

♂ Scape broader than long, about five times as wide as the pedicel, strongly concave on the side next the head.

Black; clypeus, spot rounded above on supraclypeal area, sides of face to above the antennae rounded a little away from the orbit above, longitudinal stripe on outer side of scape, spot on tegulae and tubercles, knees, tibiae and tarsi, except large subapical inner infuscate spots on anterior and middle tibiae and a dark subapical mark surrounding hind tibiae subapically, yellow.

Eighth sternite with the basal process strong, dorsoventrally expanded, the apical process elongated, strongly chitinized as seen from the side with a carina ending in a tooth about half way to the end, the end is acuminate and regularly curved ventrally from the plane of the sternite. Stipes regularly rounded at apex with a few plumose brown hairs, exceeding a little the sagittae and the inner margin curved for their reception, the narrowed portion longer than the broader basal portion.

♀ Length 6.5 mm.; wing 5 mm.; ♂ 5.5 mm.; wing 4.5 mm.

Described from nine ♀ and one ♂ collected at Karuizawa, September 1913.

Type ♀, allotype and paratypes in the author's collection, paratypes in the collection of the Hawaiian Sugar Planters' Association.

Hylaeus gnathylaeoides n. sp.

♀ Clypeus with a broad longitudinal mark not attaining the margin (and 2 subapical lateral spots in the paratype) and (paratype) a spot on the supraclypeal area yellow. Supraclypeal area slightly contracted in the middle, a little expanded and strongly elevated and channeled above, the channel extending feebly to the anterior ocellus.

Black, longitudinal mark on clypeus, sides of face to the level of the summit of the clypeus and triangularly extended along the orbit a little above the superior margin of the antennal sockets, sometimes a supraclypeal spot, band on collar narrowed and interrupted medially, large spots on tegulae and tubercles, anterior knees, stripe on tibiae outwardly and tarsi, outer base of middle tibiae, and basal half of hind tibiae yellow; flagellum beneath, tarsi and margins of abdominal segments brownish, calaria pale. Wings hyaline, the venation brownish.

Clypeus, supraclypeal area, and sides of face longitudinally lineolate or striolate, with shallow, sparse indications of punctures; front and vertex a little shining, strongly and closely punctured; mesonotum opaque

closely and strongly, a little more finely punctured; mesopleura similar; scutellum a little more sparsely and coarsely punctured; metanotum coarsely chartaceous or rugulose, opaque; area of propodeum with a few rather coarse, irregular reticulations basally, nearly smooth apically, sides with fine sculpture concealed by the fine, scattered pubescence, the posterior face lineolate chartaceous, carinate laterally below.

First tergite highly polished and shining, the second and following a little more obscure from the fine scattered pubescence. Without definitely indicated hair bands and apical margins not noticably contracted; sternites a little more pubescent and minutely punctate.

A stout, compact species, the head broad, the eyes converging below the pronotum with the anterior margin of the collar rounded, the collar narrowed and subinterrupted in the middle, the recurrent nervures interstitial or nearly so.

♂. Third sternite with a spine on either side the disc and connected by a ridge.

Scape enormously enlarged, the lower side prolonged beyond the insertion of the flagellum, the upper (inner) side more expanded below.

Black, clypeus except a linear lateral border, labrum and mandibles largely, dot on the genae behind base of mandibles, another on the temples a little below the summit of the eyes, sides of face to above the antennae obliquely rounded from near the orbit to the antennae, spot on upper part of supraclypeal area, scape except infuscated longitudinal discal area, pedicel, spot on either side the neck, collar nearly continuous with the tubercles, base of tegulae, knees, tibiae and tarsi except inner apical infuscate areas on tibiae yellow (reddened by cyanide in the material described). The marks on the underside of the head and on the neck absent in ♂ paratype.

Seventh sternite with two very small simple lateral lobes apically. Eighth sternite with a basal process, the apical process nearly straight sides narrowed apically and curved, the apex strongly chitinized and dorso ventrally thickened. Stipites longer than sagittae evenly narrowed on the inner (median) side to apex from base (no distinction of apical and basal parts).

♀ Length 6 mm.; wing 4.5 mm.; ♂ length 4.5 mm.; wing 3 mm.

Described from two females and two males, the former collected at Karuizawa September 1913, the latter merely labelled Japan.

Type, allotype and paratypes in the author's collection.

Hylaeus Matsumurai n. sp.

♀. Edge of collar subcarinate, acute, the pubescence on its posterior edge (relatively) strong and plumose.

Black; sides of face truncate below the lower edge of the antennal socket and acutely produced along the eye margin sometimes above the

upper edge of the antennal sockets, tubercles, basal spot on tegulae, basal half of front tibiae outwardly, basal spot on middle tibiae, and basal half of hind tibiae yellowish; calcaria pale, wings yellowish hyaline, the venation brownish.

Second and following tergites with declined scattered hairs especially on the margins where they simulate hair bands.

Clypeus, supraclypeal area and sides of face longitudinally lineolate, coarsely punctate with shallow punctures, those on the clypeus separated by a little more than the diameter of one, front a little shining, rather coarsely and closely punctured, vertex a little more discretely so. Mesonotum opaque, similarly punctured, punctures separated by a little more than the diameter of one, scutellum a little more shining, similarly punctured; mesopleura a little more deeply and unevenly punctured; area of propodeum strongly reticulate, the ridges very strong, sides of propodeum obliquely punctured more or less separated from the basolateral areas (which are weakly reticulate) by a Y-shaped carina, which also separates the sides from the posterior face. Sculpture of the posterior face irregular, partly concealed by appressed scattered plumose pubescence.

First tergite smooth and shining, the second and following less shining with scattered minute punctures, second a little contracted at apex; sternites similar to the tergites but the punctures stronger, all the margins a little translucent. A species of the aspect of the *modestus* group. Head about as broad as long, eyes a little convergent below. Recurrent nervures interstitial or nearly so.

♀. Length 7.5 mm.; wing 5.5 mm.

Described from 7 females collected at Karuizawa, September 1913. In the material are three ♀ taken at Okitsu in June, 1913, and one marked Japan which may either represent the same species or another closely allied.

Types and paratypes in the author's collection. Paratypes in the collection of the Hawaiian Sugar Planters' Association.

Named in honor of the eminent entomologist, Shonen Matsumura.

Hylaeus paulus n. sp.

♀. Smaller species, lateral face marks in a line against the orbit reaching about to the level of the summit of the clypeus, tegulae with a yellow spot. Collar more narrowed medially, punctures of the mesonotum shallower.

Black; face marks in the type reduced to a line along the orbits, a spot on the tubercles and tegulae, anterior tibiae with a short basal outward stripe or spot, spot on outer base of middle tibiae and basal 1/3 of hind tibiae yellow, calcaria pale, flagellum pale brownish beneath; apical tarsal joints brownish; wings hyaline, the nervures brownish.

Clypeus, supraclypeal area, and sides of face opaque, irregularly longitudinally lineolate or striolate with indications of sparse, shallow punctures; front and vertex a little shining, finely and strongly discretely punctured; mesonotum similarly but more shallowly punctured, the surface between the punctures tessellate or lineolate; mesopleura similar; scutellum similar, a little more sparsely punctured; metanotum irregularly lineolate and definitely sparsely punctured; area of propodeum strongly reticulate basally more or less chartaceous apically, sides and posterior face shagreened, posterior face angulate at the sides.

First tergite highly polished and shining, with sparse, fine punctures rather regularly disposed; second and following a little less shining from the fine scattered pubescence and a transverse microscopic lineolation. Tergites 1-3 a little contracted at apex and with a slight trace of apical interrupted hair bands. Sternites transversely lineolate tessellate.

A rather elongate little species, the head a little longer than wide, eyes feebly convergent below. The recurrent nervures interstitial or nearly so.

♀. Length 5 mm.; wing 4 mm.

Described from one ♀ specimen collected at Karuizawa September 1913.

Type in the author's collection.

Hylaeus monticola n. sp.

♀. Larger species, the face marks in the type triangular not reaching above the level of the lower margin of the antennal pit and not filling the sides of the face, tegulae black, the punctures of the mesonotum closer and much deeper, the metanotum is rough surfaced and the punctures closer but less evident, the markings of the anterior and middle tibiae are greatly reduced; the sculpture of the propodeal area inclines to be striate, longitudinally carinate, the puncturing of the first tergite is absent and this is microscopically transversely lineolate. The wings are yellowish hyaline. The head is shorter and the eyes more convergent.

♂. Line on the anterior base of mandibles, clypeus except narrow apical line and sutures very finely, sides of face obliquely truncate above from the middle of the supraclypeal area, the upper margin arcuately emarginate opposite the antennal sockets, the angle against the eye margin not reaching above the middle of the antennal sockets, supraclypeal area notched above, stripe on scape in front, small spot on tegulae, suffused spot on anterior femora in front and at the knee, on anterior tibiae in front, spot on middle tibiae on exterior base, basal 3/4 of middle and hind basitarsi, and basal one-third of hind tibiae sulfur yellow; flagellum pale brownish beneath, tarsi otherwise brownish.

Edeagus, seventh and eighth sternites closely resembling those of *Hylaeus episcopalis* (Cockerell) as figured by Metz and in material which I have determined as that species from my own collection, differing principally from that species by the feebler development of the apical lobe of the seventh sternite. The figure of the edeagus of *H. episcopalis* does not give a good impression of its structure, if my determination is correct. In both that species and *H. monticola* the sagittae are abruptly divergent a little beyond the base and then convergent and each sagitta bears a small lobe at the divergence, its apical limit marked by a notch.

Scape little expanded, arched; second tergite contracted at apex, third more feebly.

♀ Length 7 mm.; wing 5 mm.; ♂ Length 6.5 mm., wing 7 mm.

Described from two ♀ and four ♂ specimens collected at Chiuzenji (4000-5000 ft.) July-August, 1913.

Type, allotype and paratypes in the author's collection.

Hylaeus sp.

♂ Similar, supraclypeal area broader, yellow only along the margins, scape and tubercles black, front basitarsi pale, band on hind tibiae shorter. Edeagus, seventh and eighth sternites much as in the preceding but the apical lobe of seventh sternite more developed and the stem of the process of eighth sternite a little more contracted before the apex Length 5.5 mm.; wing 4.5 mm.

This male I could not associate with any of the females with any certainty and, since the single specimen (Nikko August, 1913,) did not make the coloration-characters sure, it seemed better to leave it unnamed rather than establish a name in this difficult section of the genus.

There are doubtless many other species of the genus in Japan remaining to be studied.

22. North American Hylaeus.

Metz in his excellent paper on the North American *Prosopis* (Tr. Am. Ent. Soc. 37:85-146, 1911) has laid a good foundation for the study of the North American species. He has not, however, had sufficient grasp of the geography of North American entomology and on that account and on account of his attributing too great variability to the species in

regard to sculpture he has fallen into some errors in his account of the species. Crawford has pointed out (Can. Ent. 45:154-156, 1913) his error in sinking *Hylaeus mesillae* (Cockerell) as a variety of the widely distributed *H. Cressoni* (Cockerell). I wish here to make some additional notes and comments.

Hylaeus basalis (Smith).

This is a species of the Boreal and Transition zones and seems to be confined to them. All the specimens I have taken have been from the mountains in California and Oregon. Metz speaks of it as not restricted in its destribution. My localities for it are Oregon: Cascade Mountains,—Detroit, Mt. Jefferson, Three Sisters; Coast Mountains—Benton Co. (J. C. Bridwell). California: Siskiyou Mountains (F. W. Nunenmacher), San Jacinto Mountains (Bridwell).

Hylaeus Nunenmacheri n. sp.

The well-marked *Hylaeus basalis* (Smith) has hitherto remained rather isolated. Metz' *H. potens* only known in the male sex has genital characters similar but is quite different externally from *basalis*. It was with interest that I have discovered mixed with my material of *basalis* a very similar but smaller species.

♀ Clypeus a little broader in proportion more sparsely punctured, the punctures less oblique, the surface less lineolate, particularly apically; sculpture of basal area feebler and its integument more shining. The rugae are confined to a few short weak longitudinal ridges along the anterior margin while there are some reticulations in *basalis*. In both species the integument of the area behind the rugosities is microscopically tessellate but it is shining as seen with a hand lens in *Nunenmacheri*, opaque in *basalis*, due to the greater impression of the lines bounding the tessellations in the latter.

Length 7 mm.; wing 5.5 mm.

♂ Clypeus shorter and broader than in *basalis*. The integument of the area duller than in the ♀ but the rugae similar.

Seventh sternite with the lateral lobes more transverse than in *basalis* the sinus between them less profound, their posterior margin brace-shaped ⌒ while in *basalis* the posterior sinus is profoundly V-shaped and the sides are rounded off toward the base.

On the 8th sternite the short median apical process is shorter and the sides of the basal part in a straight line with each other, while in *basalis* they gently recede from each other.

Length 7 mm.; wing 4.5 mm.

Two ♀ and one ♂ Siskiyou Co., California, June 2, 1911 (F. W. Nunenmacher); one ♂ Santa Cruz Mountains, Santa Clara Co., Cal., April 25, 1913 (Bridwell).

♂ Type, allotype, and paratypes in the author's collection.

Named in honor of F. W. Nunenmacher, whose remarkable ability as a collector has revealed many new and interesting California and Arizona insects.

Whether the fact that the coastal mountains of California where this species has been discovered were insular during the Tertiaries has anything to do with its evolution from *basalis* remains to be elucidated.

Hylaeus conspicuus (Metz).

Corvallis, Oregon; Benicia, Berkeley, Santa Cruz Co., San Gabriel Mountains, California (Bridwell).

Hylaeus tridentulus (Cockerell).

Mt. Jefferson, Oregon; Coast Mountains, Benton Co., Ore. (Bridwell). Apparently a Transition species.

Hylaeus varifrons (Cresson).

Oregon: Crater Lake (O. H. Swezey), Three Sisters, Mt. Jefferson (J. C. Bridwell).

New Hampshire: Durham (J. C. Bridwell). Another Transition species.

Hylaeus episcopalis (Cockerell).

I am convinced that at least three species of males are confused in Metz' treatment of this species, but I am not yet prepared to assign names for them on account of the involved synonymy.

Hylaeus maritimus n. sp.

♀ Black, elongate spot on the sides of the face obliquely truncate to the eye margin at the level of the middle of the antennal socket, interrupted band on collar not greatly narrowed within, tubercles, spot on the subhyaline tegulae, spots on the outer base of front and middle tibiae, basal third of hind tibiae (band prolonged outwardly) yellow. Flagellum pale brown beneath; margins of tergites and sternites testaceous, subhyaline. Wings brownish subhyaline, venation brownish

Pubescence of head scattered, collar feebly pubescent on its posterior side, plumose pubescence well developed on the posterior angles of the propodeum. Interrupted whitish hair band on posterior margin of first tergite and a thinner and less definite one on second, surface of second and following tergites with fine scattered declinate hairs and some longer and more erect ones.

Supraclypeal area and clypeus longitudinally lineolate, obliquely punctured with piligerous punctures, those of the apical half of the clypeus distant from one to two times the diameter of a puncture, lineolations of the sides of the face obliquely longitudinal, directed to the clypeus, front longitudinally aciculate-punctate, vertex more definitely and discretely punctured, occiput transversely lineolate or minutely rugulose. Mesonotum opaque closely and shallowly punctured, the punctures not separated by one-half the diameter of a puncture; mesopleura more shining, more finely and sparsely punctate, contrasting with the opaque longitudinally rugulose metapleura; scutellum similar to the mesonotum; metanotum more opaque with very shallow almost contiguous punctures; propodeum with the area only fairly well defined, rather coarsely (microscopically) tessellate with a few rugae or reticulations at the base these variable but not much developed, sides and posterior face of propodeum shagreened, posterior face angulate at the sides, not carinate, the basolateral areas not defined.

Tergite one microscopically sparsely punctate, the surface smooth and a little shining, microscopically transversely lineolate, remaining tergites similar but less shining from the pubescence, tergites not perceptibly contracted; sternites similar but with minute punctures.

Head greatly developed longer than broad, inner orbits sinuate, feebly converging below, supraclypeal area but little elevated in the middle and gradually descending to the plane of the front, margins angled between the antennae, the furrow continued feebly to the anterior ocellus, temples broader than the eyes as seen from above, collar with rounded margin a little narrowed medially. Recurrent nervures received by the second cubital cell or the second interstitial.

Length about 6.5 mm.; wing 5 m.m

♂ Similar to the female, triangular spot at apex of scape, clypeus, supraclypeal area, sides of face with a clavate extension extending from the lower edge of the antennal socket to above its upper edge; stripe on front tibiae, apical as well as basal spot on middle tibiae, and basi-

tarsi whitish yellow, rest of front tibiae and the tarsi brownish (other pale markings as in ♀).

Eighth sternite similar to that of *H. Cressonii* but the stem shorter and the lobes more developed (as long from the base of their expansion as their stem). Membraneous flap of seventh sternite more developed and hairy, the teeth of the other flap fewer and larger, more or less hooked at the end.

Length about 5.5 mm.; wing 4 mm.

Described from 16 ♀ and 1 ♂ taken in the vicinity of Lake Merced in the sand dune district of San Francisco, Cal., 1 ♀ July 17, 1903 (F. E. Blaisdell), remainder August to Sept., 1910, (J. C. Bridwell).

A very distinct species related to *H. conspicuus* (Metz), *Cressonii* (Cockerell) and *rudbeckiae* (Cockerell). The female is distinguishable by the large head and the translucent margins of the abdominal segments while the male may be separated from that of *conspicuus* by the absence of the peculiar flattened impression over the basal portion of the clypeus, lower part of supraclypeal area and adjacent sides of the face; the supraclypeal area is narrower and the scape is less expanded and has far less yellow on it, the white hair bands on tergites 1 and 2 present in *maritimus* and not in *conspicuus*. *H. rudbeckiae* (Cockerell) ♂ is also similar but has the baso-lateral areas of the propodeum well defined by a carina separating them from the posterior face. Both these species which resemble *maritimus* most closely have the eighth sternite quite different, as may be seen from Metz' figures. Apparently *Hylaeus Stephensi* (Crawford) is very close to this in the structure of the hidden sternites but the face markings are quite different in both sexes.

Hylaeus oregonensis n. sp.

I have a form of this genus which is represented in my collection by two ♀ and two ♂ collected in the high Cascade Mountains of Oregon, Mount Jefferson (Bridwell), which seem to differ but little externally from what I have identified as *H. polifolii* except that the reticulations of the propodeal basal area and particularly the basolateral areas are more strongly developed and the clypeus at the summit seems a little broader. I had supposed that this would prove to be *nevadensis*, but

while the examination of the concealed sternites reveal a seventh sternite like that figured by Metz for *nevadensis*, the eighth sternite is indistinguishable from that of his *H. calvus*.

Type ♂, allotype, and paratypes in the author's collection.

Hylaeus nevadensis (Cockerell).

One ♂ collected at Big Lake near Mt. Washington, Oregon (Bridwell) seems certainly this species. The narrow margin of the supraclypeal area is white like the clypeus and sides of the face. This is the case also in some individuals of *H. polifolii*.

Palaeorrhiza imperialis (Smith).

Prosopis imperialis Smith. Jour. Linn. Soc. Zool. 7:44 ♀ Dory 1863.

Prosopis malachisis Friese (*nec* Smith). Ann. Mus. Hung. 7:184 ♂ Tenimber Larat 1909.

Palaeorrhiza Muiri Perkins. Ann. Mag. Nat. Hist. (8) 19: 103 ♂ Amboina 1912.

The description of *Prosopis malachisis* Friese ♂ does not mention the carinae on the third nor the angulate second sternite but otherwise agrees perfectly.

One ♂ collected on Amboina July-August 1908 (F. Muir).

It seems likely *Prosopis malachisis* Smith is also a *Palaeorhiza*.

(?) DIPHAGLOSSIDAE

22. Binghamiella antipodes (Smith).

Sphecodes antipodes Smith. Cat. Hym. Brit. Mus. 1:37 ♀. 1853.

Binghamiella antipodes Cockerell. Bull. Am. Mus. Nat. Hist. 23:235. 1914.

2 ♀ 3 ♂ Stradbroke I. Moreton Bay, Queensland (J. C. Bridwell), Sept. 20, 1915.

The tongue of this bee is truncate at apex, scarcely emarginate, ciliate at apex, excavated above, the paraglossae about as long, obliquely deltoid,

labial palpi 4-jointed rather stout and short about as long as the tongue, the basal joint longest, apical joints subequal. Apical portion of maxilla ovate, expanded, sinuate or submarginate within and without near the apex hyaline within, labrum transverse, ciliate anteriorly with 2 short weak median process basally elevated into a ridge, notched medially. Upper inner margin with a narrow fovea.

♀ Antennae with pedicel and flagellar joints 1 & 2 subequal, following joints subequal, a little broader than long to a little longer than broad. Tergites 2 and 3 with a narrow transverse submedian impressed line. Pygidial area strongly narrowed near the base, narrow and truncate at apex, longitudinally, subcarinate medially.

♂ This sex has not previously been described. It is very much like the ♀. The abdomen a little smaller and narrower. Face clothed with coarse silvery hairs as in *Sphecodes,* mandibles with a single subapical tooth within (the ♀ has two), antennae about as long as the head and thorax, scape short and stout, a little longer than the 3d flagellar joint, with silvery plumose hairs outwardly; pedicel and 1st flagellar joints broader than long together about as long as the 2nd flagellar joint, this shorter than third, this and following joints subequal about twice as broad as long, the flagellum more or less nodulose and *Sphecodes*-like.

Tergite 4 has a sub-basal narrow impressed line while 2 and 3 are as in the ♀.

Seventh and eighth sternites concealed and highly modified, the seventh with divergent basal struts, apically membraneous and cleft into 2 quadrate lamellae; 8th basally lamelliform apically produced into a dark narrow parallel-sided, strapshaped spine, very slightly expanded apically and rounded.

Cardo well developed about as broad as long, basal portion of stipes short, the median apical angles a little acute, apices nearly straight, the apical half outwardly with rather setose whitish hairs. Sagittae together ovate lanceolate excavated or broadly channeled above, inner margins adjacent in the basal half and then separated in a gentle curve and approximate apically.

The affinities of this genus are clearly with *Paracolletes* and they together diverge from *Colletes* by the presence of the pygidial area. Here too belong several of the genera of bees with emarginate tongues and 2 cubital cells rather than with *Hylaeus.*

DUFOUREIDAE.

23. Mimulapis n. gen.

Related to *Halictoides* but with greatly elongated mouth parts and a well developed malar space. Maxilla with the cardo nearly as long as the stipes, lacinia acuminate about two-thirds as long as the stipes, palpi about as long as the stipes, 6-jointed, basal and 2nd joint larger than the remainder, basal about half as long as the second, second a

little longer than either the 3rd or 4th, 5th and 6th successively shorter but elongate; labium with the glossa and palpi about equal in length to the mentum, paraglossae not quite attaining the apex of the first palpal joint, the palpi 4-jointed elongate, first 3 joints flattened, 4th subcylindrical, 2nd joint longest as long as 3rd and 4th together, glossa hairy acuminate, lance-linear.

Wings with two closed cubital cells, the second receiving the recurrent nervures, about 1/5 its length from either end. Stigma well developed, radial cell lanceolate, pointed on the wing margin, transverse median a little before the basal. Cubital cells subequal on the cubitus, the second narrowed in front, only about 1/3 as long on the radius as on the cubitus.

Head flattened elongate, mandibles ♀ unidentate within, labrum free large, not twice as long as broad, clypeus strongly produced, malar space 2/3 as long as wide, genae very narrow, occiput well developed, wider than the width of the eye.

Collar sloping in front not narrowed medially. Scutellum simple, propodeal area well defined, propodeum rounded abruptly down to the posterior face which is not carinate laterally.

Claws unequally cleft. Hind tibiae of female flattened with a stiff scopa on both sides, broader than the basitarsus. Legs of male more or less deformed.

♀ Antennae short, clavate only the terminal segment of the flagellum as long as broad, second and third flagellar joints ringlike, forming, with the first, a sort of funicle which tapers from the 6-jointed club. ♂ Antennae deformed, segments 1-4 of the flagellum forming a bulb-shaped structure emarginate beneath and this strongly concave under surface with a dense brush of short stiff erect brown hairs, sixth abdominal segment ♀ retracted. ♂ Abdomen deformed, last tergite with a longitudinal median area.

Type *Mimulapis versatilis* Bridwell.

Mimulapis versatilis n. sp.

Black with some chalybaeus reflections on head, thorax and abdomen above. Mandibles more or less piceous, legs and antennae brownish, tergites with the depressed margins broadly and the sternites more narrowly brownish translucent.

Rather loosely pubescent with whitish pubescence which becomes brownish or fulvous on the mandibles, labrum, clypeus, mesonotum, tibiae in part, tarsi, venter and tergites 3-5.

Clypeus convex with a few coarse scattered punctures, a fine furrow extends from between the antennae a little more than half the distance to the anterior ocellus, front and vertex closely and strongly punctured, the punctures confluent on the occiput. Mesonotum similarly punctured, the furrows well defined; scutellum more sparsely punctured shining; metanotum shagreened; area of propodeum irregularly longitudinally striate basally, with a few transverse striae apically; mesopleurae more

or less irregularly punctured, smooth in part, tumid, sides and posterior face of propodeum finely shagreened, its basolateral area (undefined) finely punctate.

Abdomen ♀ ovate, 1st tergite with the surface punctate except the translucent depressed margin but not closely nor coarsely, remaining tergites with the surface obscured by oblique fine piliferous punctures and the declined hairs from them, sternites with the piliferous punctures stronger. Abdomen ♂ more elongate, tergites 1 and 2 more strongly punctate, the translucent margins of the tergites narrower, tergite 7 with a flat narrow brown longitudinal smooth area extending its entire length. Sternites 2-4 more or less emarginately depressed posteriorly, the 4th with a triangular flattened reversed tooth on either side, 5th depressed shining, arcuately emarginate behind, sixth retracted, the basal portion with a broad median longitudinal channel and fulvous hairs on either side, with an oval apical process bearing a blunt spine on its ventral side just before the apex.

The ♂ has the legs more incrassate, the anterior claws large and evenly cleft, the anterior tibiae produced into a curved flattened apical spine in the axis of the tibia, the middle tibiae are greatly subtriangularly incrassate in the middle with a much greater flattened spinous process at the end which bears a brush of peculiar hairs a little before the apex, its basitarsus expanded apically, the 3 median tarsal joints cordate (in all the tarsi), the hind tibiae widest a little beyond the middle within and bear on the inner surface beyond, (as also the basitarsi), long shining white hairs.

♂ Mandibles elongate, acute, the tooth reduced, bearing a tuft of white hairs at base. Antennae beyond the basal bulb with depressed areas, truncate at the end.

♂ Seventh sternite developed into two elongate apical parallel membraneous lobes separated by a narrow slit, with sparse whitish hairs apically, bent at the base of the slit and narrowed apically to a blunt point, with two basal struts much as in *Hylaeus;* 8th sternite with a subquadrate basal piece and an apical elongate median process strongly chitinized, irregularly prismatic with four sides, with a gentle dorsoventral sigmoid curve, produced about as far as the width of the basal piece, with two broad basal struts not so long as the apical process, parallel separated from each other by a slit nearly as broad as each strut.

Edeagus with the cardo transverse twice as broad as long a little produced medially, the stipes with the inner angle sub-basal, the outer side sinuously emarginate near the base of the sagittae, with a slender curved apical process arising near the apex of the sagittae; sagittae strongly geniculate near the base, their inner margin notched at base and then somewhat expanded, their main mass lying above the plane of the stipes and cardo, but their tips deflexed below the end of the stipes.

♀ Length 8 mm.; wing 5.5 mm.; ♂ length 9 mm.; wing 5.5 mm.

Described from 4 ♀ and 8 ♂ collected in the Boreal regions of Mt. San Jacinto, Calif., at elevations of 7500-9000 ft., visiting the flowers of different species of *Mimulus*. July, 1912 (Bridwell). The flowers were of two types, one with an open throat into which the bees entered directly, while in those of the other type with the closed throat they entered sidewise on either side of the gibbous portion closing the throat.

Type ♀, allotype and paratypes in the author's collection.

24. Addendum on African Hylaeidae.

Nothylaeus Bevisi (Cockerell).

Prosopis Bevisi (Cockerell).

Amr. Durban Mus. 2:45 ♂, Natal, 1917.

Nothylaeus rubriplagiata (Cameron).

Professor Cockerell (l.c.) reports that Dr. Brauns considers *Braunsi* Alfken as synonymous with this species. Alfken has quoted Dr. Brauns as considering it identical with *N. heraldicus* Smith.

With the literature at hand I have been unable to make certain whether *N. rufipedioides* or *Junodi* has precedence.

Prosopis pernix, sandracata, and *gracilis* Bingham and *P. quadrilineata* and *quinquelineata* Cameron are species of *Allodape,* as has been pointed out by Meade-Waldo and Alfken.

Descriptions of New Species of Hymenopterous Parasites of Muscoid Diptera with Notes on their Habits.

BY JOHN COLBURN BRIDWELL.

The Muscoid Diptera play so large a part in the economic entomology of the Hawaiian Islands that any contribution to our knowledge of their enemies has its value. The injuries to fruits by *Ceratitis capitata,* to vegetables by *Bactrocera cucurbitae,* to meats by certain of the *Sarcophaga* species and the annoyance and disease transmission by the house fly; the injury to cattle by *Stomoxys calcitrans* and by *Haematobia serrata;* the benefits in checking the seeding of the lantana by the Agromyzid seed fly; the reduction to harmlessness of the cane borer (*Rhabdocnemis obscura*) by *Ceromasia sphenophori* and the beneficial effects of the attacks of other Tachinidae upon Lepidoptera make it desirable to extend our knowledge of their enemies, particularly since efforts have been made in the past and will doubtless be made in the future to control the worst of the pests through the importation of their enemies. Farther afield are the problems of the cherry, apple and currant fruit flies, the root maggots, the sheep maggots and the screw worms all of which at least suggest the consideration of methods of natural control.

So far as I can learn there are no known hymenopterous parasites of the eggs of Muscoid Diptera. Their enemies aside from predators appear to attack them in either the pupal or larval stages. Several Pteromalids, Chalcidids and Ichneumonoids are know to attack them only in the puparium. For the practical purpose of parasitic introduction, this group of their enemies have seemed of little importance for two reasons: 1st, because they exercise little or no discrimination in their choice of host and, 2d, because the puparia which they attack are hidden away from them and require to be searched for and found, a time consuming operation which

makes it ordinarily impossible for the parasites to reach any large percentage of them. It is the other class of enemies, those which attack the maggot stage, which give promise of being of value in practical efforts to control these pests. The insects described below are all of this type. In all of these the egg is deposited in the maggot but the host is not thereby prevented from completing its growth and forming its puparium. In all these forms the adult parasite emerges from the puparium of the host.

The African insects here described were found and studied while travelling for the Hawaiian Board of Agriculture and Forestry searching for enemies of fruit flies. My travels were interrupted at Cape Town by an attack of malarial fever and the observations upon dung fly parasites were made while recuperating there. Some insects of similar habits which have accidentally entered the Hawaiian Islands and a Japanese Ichneumonid bred by Mr. Muir similar to one of the African insects studied are here described:

ICHNEUMONIDAE, Cryptinae, Stilpnini.

1. Atractodes Muiri n. sp.

Radius arising a little beyond the middle of the stigma, areolet open at apex, eyes bare, second tergite without an impressed spiracular line. Length 8.5 mm., wing 6.5 mm.

♀ Black; mandibles in the middle, second joint of trochanters, femora, and tibiae (basal third of hind tibiae infuscate), and 2d-5th abdominal segments rufous; wing base yellow; wing grayish hyaline, the nervure infuscate.

Head not as wide as thorax, about twice as broad as long above, nearly square as seen from in front; eyes subparallel, a little divergent below; malar space longer than the width of the base of the mandible; genae broader below; mandible punctured at base with the upper tooth a little longer; clypeus a little shining, rather sparsely but definitely finely punctured, the anterior margin rounded, narrowly depressed; face more opaque, protuberent in the middle above the clypeus with strong punctures separated by about their diameter, more shining and more sparsely punctured along the sides; genae nearly bare above, shining, with some scattered punctures; front similar to the face but the punctures less impressed; vertex similar to the genae; ocelli in a low triangle, lateral ocelli about equidistant from the eye margin and from

each other; antennae 20-jointed, stout, with short pubescence, moniliform at apex (5 apical joints); scape punctured, as broad as long; fourth joint about 5 times as long as broad; fifth a little shorter; the others successively shorter to the penultimate which is a very little longer than broad; last joint ovate, a little longer.

Mesonotum shining, finely hairy, sparsely punctured; parapsidal furrows fine, rather shallow, parallel, not reaching more than half the length of the sclerite; prescutellar fovea rather deep with raised transverse lines at its bottom; scutellum subtriangular, proturberent, shining, sparsely, finely punctured; mesopleura shining, with fine scattered punctures ,the anterior and posterior marginal sulci consute. Basal area of propodeum trapezoidal with about 15 punctiform pits occupying its surface; petiolar area strongly concave, reticulate above transversely ridged below; external areas smooth basally, reticulate along the costula; dentiparal area more or less irregularly reticulate; spiracular area reticulate, the spiracles small; pleural areas transversely striate or sulcate, reticulate next the coxae.

Post petiole somewhat aciculate, the spiracles a little nearer the apex than to each other; remainder of abdomen smooth, shining and highly polished; ungues slender, elongate; subdiscoidal nerve arising from the middle of the nervellus; subdiscoidal nerve of hind wing arising far below the middle of the nervellus.

Described from one ♀ bred from the puparium of an undetermined species of *Sarcophaga* living in decaying fish used as fertilizer in the field. Okitsu, Japan, Jan. 1913. (F. Muir). Type in the author's collection.

2. Atractodes Mallyi n. sp.

Very similar to *A. Muiri.*

Mandibles entirely black; 2d joint of trochanter black; fifth segment of abdomen dark; the coloration otherwise as in *Muiri.*

Anterior margin of clypeus not depressed, a little produced in the middle, smooth and shining at apex; front and vertex very highly polished and shining, with only a few scattered minute punctures; ultimate joints of antennae not so distinctly moniliform.

Mesonotum more highly polished and shining; the parapsidal furrows more distinct, reaching farther to the rear, punctures minute, indistinct, scattered; median elevated area of metanotum trifid in front (simple in *Muiri*); sides of pronotum imperfectly striate (only the posterior margin consute in *Muiri*); basal area of propodeum transverse, irregularly rugose or shagreened.

Spiracles of first tergite about as far from each other as from the apex, post petiole less expanded.

♂ Abdomen not at all compressed, rounded at apex, tergites 2-5 rufous or all but 3d blackish. Antennae 25-jointed not all moniliform. Length 6.5 mm., wing 5.5 mm.

Described from 29 ♀♀ and 8 ♂♂ bred at Cape Town from an undetermined *Sarcophaga* living in human excrement and experimentally from other species of *Sarcophaga* living in carrion. The habits of this species were discussed under the name of *Altotypa* sp. in these Proceedings 3:492-493, 1918.

The type ♀ and allotype ♂ will be placed in the South African Museum; paratypes in the collection of the Hawaiian Board of Agriculture and Forestry, in the collection of the Hawaiian Sugar Planters' Association and in the private collections of P. H. Timberlake and of the author.

Named in appreciation of Charles W. Mally, Cape Entomologist, and his works upon the biology and economics of fruit flies and the house fly including studies of their natural enemies.

BRACONIDAE, Vipioninae.

3. Microbracon Terryi n. sp.

♀ Black, mandible in the middle, sides of all the tergites (more broadly in front so that the first and second are only dark spotted discally or are entirely yellow), the ovipositor (but not the sheaths), knees, front femora apically more or less, hind tibiae basally more or less, and calcaria yellow, the pale markings suffused and their limits indefinite, mouth more or less reddish, wings and venation fuscous subhyaline.

Highly polished and shining, the second tergite feebly rugose behind the median area of the first, its anterior furrow interrupted medially about one-half the width of the median area of the first, suture of the connate second and third tergites smooth.

Antennae about 28-jointed, longer than the head and thorax Ovipositor longer than the head, thorax, and abdomen together.

Length 3 mm., ovipositor 4 mm., wing 3.5 mm.

♂ Similar to the female, the abdomen sometimes entirely dark.

Described from 24 ♀♀ and 18 ♂♂ from the Hawaiian Islands: Honolulu (Terry, Timberlake) Oahu Sugar Co.

Plantation (Timberlake); Maui, Kipahulu (Swezey); Hawaii, Pahala (Swezey).

Bred from *Tephritis crassipes* breeding in the heads of *Bidens* by the late F. W. Terry, Honolulu, Jan. 1906, by P. H. Timberlake, Honolulu, July 1918, and by J. C. Bridwell, Wailuku, Maui, Aug. 1918.

This species is an immigrant, doubtless arriving with its host, from what country we can only conjecture. The habits of the species were studied by Mr. Terry in Jan. 1906, and Mr. Swezey's material from Maui was taken the same year. This is doubtless the *Bracon* recorded by Dr. Perkins in the introduction of the Fauna Hawaiiensis as attacking *Tephritis*.

Type ♀ and allotype ♂ in the collection of the Hawaiian Entomological Society; paratypes in the U. S. National Museum, in the collection of the Hawaiian Sugar Planters' Association and in the private collections of P. H. Timberlake and of the author.

Opiinae.

4. Opius lantanae n. sp.

♀ Length 2 mm.

Black; the legs, including coxae, palpi, clypeus and mandibles in part, scape and pedicel (and usually the first tergite and the anterior half of second) yellow; tegulae brownish; wings hyaline, the nervures brown.

Smooth and shining, highly polished except the face, which is very slightly microscopically roughened; propodeum and first tergite rugose; second tergite slightly aciculate sublaterally; the suture of the connate second and third tergites finely crenulate or almost smooth.

Head a little more than twice as broad as long; mandibles entire beneath, widely separated from the clypeus; the malar space as long as the width of the mandible; face with a rounded median ridge; clypeus not twice as broad as long; eyes oval, parallel; posterior orbits not narrowed below, narrower than the width of the eye; lateral ocelli about four times their width from the eye margin; antennae about 23-jointed, inserted above the middle of the eyes; first joint of the flagellum about three times as long as broad, second and following joints successively shorter, all as long as broad.

Mesonotum evenly convex, not impressed; parapsidal furrows indicated as deep rounded impressions at the anterior margin; mesopleural impressions imperfectly crenulate.

Stigma lanceolate; the radius arising near its basal third, first abscissa of radius less than half as long as the width of the stigma, one-fifth the length of the second, second abscissa one-half longer than the first transverse cubitus, a little less than half the length of the third abscissa; recurrent nervure joining the second cubital cell, which is five-sided.

Second tergite finely longitudinally aciculate antero-laterally; suture between the connate second and third tergites evident, usually finely crenulate, the highly polished median triangular area of second tergite separated from the lateral areas by imperfectly defined, percurrent, feebly aciculate, diverging impressions; third tergite smooth and highly polished; second and third tergites subequal in length, the third widest and three times as broad as long; ovipositor exserted, nearly one-half the length of the abdomen.

♂ The sculpture of the abdomen in the males varies greatly; some have the second and following tergites smooth, the suture of the second and third tergites not evident, not at all crenulate, while in others the entire second tergite is aciculate. Antennae 20–24-jointed, usually 22 or 23.

Described from 51 ♀ and 36 ♂ specimens bred from the Lantana-seed Agromyzid (still undetermined) by O. H. Swezey, P. H. Timberlake and J. C. Bridwell upon the island of Oahu. First bred by Mr. Swezey from material collected by him May 12, 1913.

Type ♀, allotype ♂ and paratypes in the collection of the Hawaiian Entomological Society; paratypes in the collection of the Hawaiian Sugar Planters' Association, in the U. S. National Museum, and the private collections of P. H. Timberlake and J. C. Bridwell.

This runs in Gahan's carefully elaborated tables of the North American species of *Opius* (Proc. U. S. Nat. Mus. 49: 68-72) to *Opius oscinidis* (Ashmead) known only in the male sex from material bred from an *Oscinis* breeding in the leaves of *Plantago major* at Washington, D. C. Our species differs but little in the characters given in Ashmead's description. The suture at the base of the scutellum is certainly not lunate in our species, nor are the lower parts of the head (except the mandibles and the clypeus) yellow. Doubtless our species is distinct and more differences will be found when the ♀ of *oscinidis* is studied.

The present species is of very great interest from its bearing upon the control of lantana by insects, the Agromyzid attacking the seeds being one of the most significant of the insects introduced into the Hawaiian Islands from Mexico for that purpose. We must consider it almost certain that it will hereafter play a very restricted part, since recent breedings from lantana berries in Honolulu give many more parasites than flies. In the country districts of Oahu, apparently, the parasite is as yet not so numerous and it has not yet been found on the other islands.

Mr. Pemberton and Mr. Timberlake have made preliminary studies of the biology of this species, not yet published. Mr. Pemberton has found that the first stage larvae are like those found by him in the Opiine parasites of the fruit flies. Mr. Timberlake has found that this species, like some of the Opiine fruit fly parasites, may pass considerable time dormant in the larval stage. From material collected on January 12, 1918, parasites emerged from January 15 to February 6, and again in October. This period of dormancy will need to be considered in future work in the introduction of this Agromyzid into other countries, for not unfrequently material supposed to have had all the insects bred out from it may still contain parasites which may escape through negligence.

Hedylus desideratus n. sp.

Head black; clypeus and mandibles piceo-testaccous; antennae reddish infuscate; palpi, maxillae and labrum yellowish; thorax above dark rufous or piceous, the lateral lobes usually blackish; legs yellowish; abdomen yellowish-ferruginous; ovipositor sheaths black; wings hyaline, the nervures brownish.

Head broader than the thorax, about twice as broad as long above; clypeus and inner orbits with sparse white hairs and strongly punctured, more sparsely so above; vertex in front of anterior ocellus transversely irregularly rugose; genae margined above nearly to the summit of the eyes, a little broader below, with a single series of feeble punctures; malar space about as broad as long; mandibles separated from the clypeus by a narrow space, simple beneath; clypeus a little less than twice as wide as high, with a rounded process in the middle; tectiform with a median ridge; eyes roundish oval, a little divergent below; posterior

ocelli five times as far from the eye margin as the distance between them; vertex and front shining, with a few lateral punctures; antennae about 43-jointed; joints 1–4 of flagellum subequal, the remainder successively shorter, all much longer than broad.

Mesonotum with deep crenulate parapsidal furrows converging behind and meeting a little in front of the prescutellar sulcus; anterior margins of the lateral lobes with a shallow crenulate marginal furrow; mesopleura with an anterior crenulate sulcus meeting the crenulate sternopleural sulcus at right angles; prescutellar sulcus divided into 4-6 pits by carinae; propodeum reticulate-areolate, with a longitudinal median carina imperfectly indicated for its anterior third.

Abdomen smooth and shining, slightly compressed, about as long as the head and thorax together, its sides nearly parallel; first tergite about twice as long as wide at apex, with a median area limited for about two-thirds of its length from the base by carinae, smooth basally, aciculate apically; the rest of the tergites smooth and highly polished, shining, only the anterior sulcus of the second distinct, this smooth and very narrowly interrupted in the middle; connate second and third tergites about one and one-half times as long as broad, about as long as the rest of the abdomen beyond; ovipositor about as long as the head, thorax and abdomen together.

Length 3.5, ovipositor 3.5, wing 3.75 mm.

♂ similar to the ♀; apical segments of the abdomen often blackish. The apex of the abdomen is rounded, not widened to the apex and truncate as in *H. habilis*.

Described from 29 ♀ and 4 ♂ bred, with many others, from various fruit flies of the genera *Dacus* and *Ceratitis* at Oloke Meji, Ibadan Nigeria, August-November, 1914.

Type ♀, allotype ♂ and paratypes in the collection of the Hawaiian Board of Agriculture and Forestry; paratypes in the author's collection.

It is with some hesitation that this species and the following are referred to *Hedylus*, since the female of *H. habilis* Marshall is still undescribed and there is some little divergence in the abdominal characters of that species from *desideratus*, *clypeatus* and *Giffardi* Silvestri. The stigma is broadly lanceolate; the first abscissa of the radius is about one half the length of the second; the cubitus is continued beyond the second cubital cell the discoidal cells are completely closed. The parapsidal furrows are stronger and crenulate in the African species and the petiole is by no means sublinear. However, they

agree in the two extremely important characters of the long maxillary palpi and the short second abscissa of the radius.

In *H. Giffardi* the second tergite is striate back to the sulcus, differing in that respect from *habilis* and *desideratus*.

This species resembles very closely *Biosteres caudatus* Szepligeti from the same region, but differs by the longer maxillary palpi, the more elongate stigma with the radius arising distinctly beyond the middle and by the structure of the prescutellar sulcus.

This species was by far the most numerous in individuals of the fruit fly parasites bred at Oloke Meji and attacked a greater number of host insects and in a greater variety of fruits than any others. It was carried in a living condition to South Africa, but was unfortunately lost during the time the author was confined in a hospital there.

Like *Diachasma Tryoni* Cameron, *D. Fullawayi* and *Opius lantanae*, this species may pass a considerable period dormant in the last larval instar.

6. Hedylus clypeatus n. sp.

♀ Resembles *H. desideratus*, but the mandibles are flattened and expanded basally; the clypeus has a semicircular impression at apex; the clypeus is a little produced in the middle above the impression and at either side of it, giving a somewhat tridentate appearance, it is somewhat tectiform about twice as wide as long; the facial ridge is flattened and shining and the face is more strongly punctured than in *desideratus;* the (true) metanotum is dentate in the middle and the first tergite is nearly smooth and shining, the thorax above is rufo-testaceous. The antennae of the unique specimen are missing.

Described from 1 ♀ specimen taken at Oloke Meji, Nigeria, July 27, 1914, upon the fruit of an unknown vine, which it was examining apparently with the intention of ovipositing. These fruits contained fruit fly larvae, which unfortunately failed to breed out, and no more were obtained.

Type in the collection of the Hawaiian Board of Agriculture and Forestry.

This species might be considered to run to *Sudylus* Buysson in Gahan's table of the genera of *Opiinae* (lc. 66-67), but the maxillary palpi in that genus are said to be short and three-jointed. It is certainly, in my judgment, congeneric with the other African species described as *Hedylus*.

Alysiinae.

7. Alysia lusoriae n. sp.

Length 6 mm., wing 4.75 mm. to 5 mm.

Rufo-testaceous, highly polished and shining; tips of mandibles, antennae from the third joint, eyes, ocelli, last joint of front tarsi, middle tarsi, sheaths of ovipositor and wing venation black or infuscate; 9–15 joints from the apex of antennae white; clypeus and mandibles, except apex, and palpi pale testaceous; wings subhyaline.

Head broader than the thorax; maxillary palpi 6-jointed, reaching the apex of the front coxae; labial palpi 4-jointed, a little longer than the three basal joints of the maxillary palpi; clypeus produced from its base, almost fusiform, somewhat tectiform, the apex a little rounded; face above the clypeus a little rugose, not distinctly ridged, hirsute, consute at the sides beneath the antennae; a consute or crenulate transverse furrow between the antennae; posterior ocelli in front of a line connecting the summit of the eyes, about four times as far from the eye margin and the occiput as from each other, connected by a furrow with the occiput, eyes orbicular, separated in front by about four times their apparent width; genae about as wide as the eye seen from the side; antennae 33-jointed, third joint shorter than fourth, the remainder successively shorter, but all longer than broad.

Thorax broader than the abdomen; parapsidal furrows strong, crenulate, converging behind and meeting before the prescutellar sulcus, anteromiddle portion parallel, abruptly directed outwardly in front, joining the crenulate marginal furrow of the lateral lobes, median lobe strongly declivous anteriorly, not arched transversely in front; prescutellar sulcus large, about twice as broad as long, divided in the middle by a straight fine carina and laterally by some three or four irregular ones or subreticulate; the lateral pits of the scutellum with longitudinal carinae or striae; metanotum laterally crenulate projecting in a trifid costate-carinate mass in the middle; sides of pronotum consute; an oblique subvertical consute impression not joining the longitudinal sulcus on the mesopleurae, the longitudinal sulcus abruptly narrowed in front and more gradually behind, broad with many transverse lines or carinae; median ventral line of mesothorax crenulate; propodeum areolate, a median carina at base more or less interrupted at the beginning of the declivity and continued as two carinae below, some transverse broken carinae at the declivity and an irregular transverse costate carina above the insertion of the abdomen; the spiracles small and circular.

Nervulus nearly its own length beyond the basal; the recurrent joining the second cubital cell, the latter therefore five-sided; radius originating beyond the middle of the broadly oblanceolate stigma, its abscissae angulate on each other, the second more than twice as long as the first, shorter than the first transverse cubitus, radial cell barely falling short of the extreme apex of the wing; second cu. cell not noticably narrowed apically, the second transverse cubitus distinctly indicated but obsolescent; subdiscoidal nervure interstitial; hind wings with a *post nervellus* (as Gahan uses the term), the submedian cell more than one-third and less than half the length of the median.

Abdomen fusiform, nearly three times as long as broad, first tergite less than twice as long as broad at apex, longitudinally sulcate with carinate margins, a median area indicated on the basal two-thirds by strong longitudinal carinae; the median area has some irregular transverse carinae basally and a median longitudinal one subapically to which some oblique carinae converge, remainder of abdomen smooth; sulcus of first suture fine narrowed in the middle but scarcely interrupted; fused second and third tergites with the suture scarcely indicated, longer than broad, nearly half the length of the abdomen; ovipositor nearly as long as the head, thorax and abdomen together.

Described from 34 ♀ collected at Fish Hoek, Simon's Bay, near Cape Town, upon cow droppings or bred from the puparia of *Musca lusoria,* breeding in cow dung there, April, 1914 (Bridwell). No males were seen or bred.

The eggs of *Musca lusoria* are deposited scattered on the surface of fresh cow droppings and hatch within a few hours; the larvae reach full growth in about five days and enter the earth to pupate. The eggs of *Alysia lusoriae* are deposited in the larvae apparently on the second day and the adults emerge from the puparia.

In Ashmead's tables* this species might be considered to run to *Asyntactus* Marshall, but in that genus the second tergite is punctured and opaque. However, if we consider the second transverse cubitus as distinct, and it is distinctly indicated though obsolescent, it would run to *Goniarcha* Foerster. The type species of this Foersterian genus is *Alysia lucicola* Haliday, from which this species differs, aside from color, in the much longer ovipositor, the subdiscoidal nervure being interstitial, and in the shorter first tergite.

* Proc. U. S. Nat. Mus. 23:104, 1900.

In Marshall's tables† it runs to *Idiasta* Foerster, but the second cubital cell cannot be said to be quadrangular, nor the radial cell lanceolate; the recurrent is received by the second cubital cell and the subdiscoidal nervure is interstitial. The ovipositor is much longer.

In Szepligeti's table‡ it runs to *Alysia*, section *Goniarcha*. Pending a thorough revision of the genera of the Alysiinae I have considered it as well to describe this species under *Alysia*.

The type will be deposited in the South African Museum at Capetown. Paratypes in the collection of the Hawaiian Board of Agriculture and Forestry and in the author's collection.

8. Aphaereta sarcophagae n. sp.

♀ ♂ Very much like *A. muscae* Ashmead as represented in the Hawaiian Islands, but with the prescutellar sulcus more profound, smooth with a single median raised line at the bottom of the sulcus; the surface of the propodeum below the transverse carinae usually less rugose than in *muscae;* sculpture of the first tergite exceedingly variable, but the segment seems to be always shorter, more triangular, the spiracles less prominent and the sublateral carinae more convergent posteriorly, and the second tergite has the sides more divergent behind.

This species, so far as the material before me goes, averages considerably larger than *muscae*, with the number of antennal joints averaging less. In both speies they vary from 19–23. The largest ♀ is about 3.5 mm., while the smallest is only about 1.75 mm.

Described from 82 ♀ ♀ and 22 ♂ ♂ bred with many others from an undertermined *Sarcophaga* breeding in human excrement at Fish Hoek, on Simon's Bay, near Capetown, in April and subsequently on board ship in May and June from the same material.

Types ♀ and allotype ♂ and paratypes in the South African Museum; paratypes in the collection of the Hawaiian Board of Agriculture and Forestry and in the private collection of P. H. Timberlake and of the author.

† Tr. Ent. Soc. Lond. 1894:499-500.
‡Gen. Jus. Braconidae. 200-202, 1904.

The larvae of the *Sarcophaga* are deposited and the *Aphaereta* oviposits in them the same day, the adults emerging from the puparia which form after the larvae have buried themselves in the ground. Several individuals of the *Aphaereta* emerge from a single puparium.

Ashmead described *muscae* as without a longitudinal median impressed line on hte occiput behind the ocelli, but in the form found in the Hawaiian Islands such a line is present.

The European *A. minor* is described as having no sulcus at the base of the scutellum. It is singular that the South African species should resemble the North American species so much more slosely than the European.

In this connection it may be well to record definitely that *A. muscae* in the Hawaiian Islands attacks *Sarcophaga pallinervis* Thompson, a species known only as breeding is cow dung. It has been repeatedly bred from this host by Mr. Swezey and Mr. Timberlake.

CYNIPIDAE, Eucoilinae.

9. Bothrochacis stercoraria n. sp.

♀. Black, highly polished and shining; mandibles in the middle, antennae, legs and abdomen dark rufous; the wings brownish yellow fading to hyaline in the radial cell and below, apically. Antennae 13-jointed, the seven apical joints larger, moniliform; third joint longer than fourth, twice as long as broad; pedicel globular; scape pyriform.

Pronotum truncate in front; collar costate, the carina emarginate in the middle; three or four longitudinal radiating striae in the superior angle of the side of the pronotum where it joins the collar carina; below this is a dense brush of fulvous hairs as in *Eucoila;* mesopleura as in *Eucoila;* mesonotum entirely without furrows, ridges or punctures; fovea of the base of the scutellum divided by the carina at the base of the cupuliferous elevation, the cupule on the posterior face of the elevation; back of the fovea is a small oval shallow impression on either side. Second tergite with a ring of dense pubescence at base.

Wings with median, transverse median, basal and radial veins fully developed; brown; second abscissa of radius straight, at right angles with the first; from the angle of the radius obscure vestiges of veins extend in a curve apically and basally. The radial cell is open about its apical two-thirds on the wing margin, wings entirely without pubescence. apical margin entire and rounded. Length 3:5 mm., wing 3 mm.

♂. Similar to ♀; antennae nearly as long as the body, 15-jointed, a little more slender apically, the joints beyond the fourth subequal in length, the fifth about three times as long as wide; third and fourth a little shorter, subequal.

Described from 10 ♀♀ and 2 ♂♂ from cow dung in the vicinity of Capetown, April, 1915, or bred from the puparia of *Musca lusoria* and *Lasiopyrellia cyanea.* (Bridwell.)

The *Lasiopyrellia,* like the *Musca,* breeds in cow dung and emerges to pupate in the soil. They feed in colonies in the more putrescent portions of the dung and scatter when ready to emerge. The *Bothrochacis* enters the dung through interstices and attacks the full-fed larvae ready to emerge from the dung.

Type and allotype is the South African Museum; paratypes in the collection of the Hawaiian Board of Agriculture and Forestry and in the authors' collection.

From the description I was at first inclined to identify this with *Bothrochacis erythropoda* Cameron (Albany Museum Records 1:164 ♂, 1904), also from the Cape, but the radius of that species is said to have the second abscissa roundly curved.

In Kieffer's tables (Gen. Ins. Cynipidae 1902), this species would run to *Lytosema,* but Cameron's genus seems to differ from Kieffer's by the position of the cupule.

This species does not appear to be able to parasitize any great percentage of the larvae of its hosts, since its movements are slow and uncertain.

Notes on Halictidae (Hymenoptera).*

BY J. C. RBIDWELL.

NOTES AND EXHIBITIONS.

Nesotocus giffardi.—Mr. Bridwell exhibited a piece of wood of the tree, *Cheirodendron gaudichaudii*, collected on the Kaumuahona Trail, showing the work of the larvae of this strange Curculionid and its characteristic pupal cell in the wood, and also gave some of the insect's habits.

Dolichurus stantoni.—Mr. Williams reported the finding of this recently-introduced roach parasite on Lanihuli Ridge at 2000 feet elevation, and stated that he had also observed it on the flat behind Tantalus.

Crabro tumidoventris.—Mr. Williams reported finding a nest of this wasp on Sugar-Loaf Hill back of Honolulu which continued specimens of the Mediterranean fruit-fly, *Ceratitis capitata.*

Psyllidae.—Mr. Crawford offered some notes on Psyllids, stating that he was monographing the Psyllidae of the South Pacific, including the Hawaiian species.

Samoan Insects.—Mr. Giffard exhibited another consignment of insects from American Samoan, this being the third lot received during the past few months. These insects were collected at the instance of Mr. Giffard by Dr. H. C. Kellers, U. S. N., and transmitted through Mr. Poyer, Governor of American Samoa. The collection as a whole included 1659 specimens and approximately 267 species, distributed by Orders as follows: Hymenoptera, 99 speciments, 25 species; Diptera, 56 specimens, 22 species; Lepidoptera, 149 specimens, 42 species; Coleoptera, 409 specimens, 83 species; Homoptera, 645 specimens, 38 species; Heteroptera, 186 specimens, 29 species; Orthoptera, 93 specimens, 20 species; Odo-

* Withdrawn for publication elsewhere.—[Ed.]

nata, 10 specimens, 5 species; Neuroptera, 12 specimens, 3 species.

In the collection, the following 25 species* have been noted which also occur in Hawaii: Hymenoptera—*Apis mellifera* L., *Polistes hebraeus* Fab., *Pison hospes* Sm., *Pison iridipennis* Sm., *Evania appendigaster* (L.), *Evania sericea* Cam., *Ischiogonus palliatus* (Cam.), *Encyrtus infelix* Emb. Diptera—*Stegomyia scutellaris* (Walk.), *Gnamptopsilopus patellifer* Thoms., *Chiromyia (Scyphella) flava* L. Lepidoptera—*Anosia erippus* Cram., *Plusia chalcites* Esp., *Stoeberhinus testaceus* Butl. Coleoptera—*Necrobia rufipes* Fab., *Araecerus fasciculatus* (De Geer), *Rhabdocnemis obscura* (Boisd.). Heteroptera—*Geotomus pygmaeus* Dallas, *Reduviolus capsiformis* (Germ.), Orthoptera—*Gryllus oceanicus* Le Guill, *Periplaneta australasiae* Fab., *Leucophaea surinamensis* Fab., *Phyllodromia notulata* (Stal.), *P. oblusata* Brunn., *Chelisoches morio* (Fab.).

Kilauea Insects.—Mr. Giffard exhibited a collection of insects made by him at Kilauea last summer.

Clerada apicicornis.—Mr. Ehrhorn reported finding this predacious bug in a pigeon's nest after the nest had been vacant for six months.

Acalles sp.—Mr. Ehrhorn exhibited a specimen of this genus of Curculionid beetles found in decaying wood.

Jassid on Amaranth.—Mr. Swezey reported finding on *Amarantus spinosus* growing by the roadside in Makiki Valley, the same Jassid exhibited by Mr. Ehrhorn at the previous meeting.

Cryptophlebia illepida in macadamia nut.—Mr. Swezey exhibited a specimen of this Tortricid moth bred from a macadamia nut. Several of the nuts were brought in by Mr. Higgins, November 19th, from Mr. Jordan's place on Wyllie street. The outer husk of the nut was being eaten by lepidopterous larvae feeding between it and the nut, in some cases

* The determinations of these species were made by Messrs. Swezey, Bridwell and Timberlake.—[Ed.]

eating the nut somewhat also. Two of the moths were reared. This is another addition to the host plants of this moth. It feeds mostly in pods of *Acacia farnesiana* and *Acacia koa*, but has also been found in lima beans, Sapindus seeds, litchi nuts, and in the pulp of mangoes.

Tenodera sinensis.—Mr. Swezey reported for Professor Bryan that one of his former boy scouts had brought him a specimen of the praying mantis, collected at Waikiki. Several times the young mantids have been liberated in Honolulu as they hatched from egg masses brought from Hawaii, but no adults have been previously collected here.

Termites in telephone poles.—Mr. Swezey reported that in examining telephone and electric light poles broken down in the recent severe wind storm, many of them were found to be badly eaten by termites. Three species were found: *Calotermes marginipennis, Cryptotermes* sp. and *Coptotermes gestroi.* The latter when present was the most destructive, eating out the heart of a pole below the surface of the ground and forming immense colonies. *Cryptotermes* was found to have eaten from bottom to top of a 20-foot pole that had been up only five years. They fed chiefly in the outer part of the pole.

ANNUAL ADDRESS.*

Observations on the Sources of Hawaiian Encyrtidae (Hymenoptera).

BY P. H. TIMBERLAKE.

In 1901 when Ashmead published his descriptions of the Hymenoptera Parasitica of the Hawaiian Islands in the Fauna Hawaiiensis, Vol. 1, Pt. 3, only five species of Encyrtidae[1] were known to occur in these Islands. Of these one species was described by Cameron in 1886 from a specimen collected by Blackburn. This species, *Encyrtus insularis,* belonging apparently to the new genus *Bothriencyrtus,*[2] has not been found since and is presumably an immigrant species that failed to become established. Two other species described as new are apparently endemic and may be known in the future as *Echthrogonatopus molokaiensis* and *Nesencyrtus kaalae,* having been wrongly referred by Ashmead to *Microterys* and *Adelencyrtus* respectively. The fourth species is considered to be the common *Encyrtus infelix* (Embleton) incorrectly identified by Ashmead as *Encyrtus fuscus* (Howard) and now known to be nearly cosmopolitan. A fifth species not mentioned by Ashmead was described in 1898 by Dr. Howard as *Blepyrus marsdeni,* and which I have recently synonymized with *Blepyrus mexicanus* Howard.

In 1907 Mr. Swezey published his observations and figure of a small Encyrtid, under the name of *Ageniaspis* species, which he found parasitizing the larvae of *Odynerus nigripennis*

*The President being absent in Army service, the Vice-President gave the Annual Address.—[Ed.]

[1] In the sense used here the Encyrtidae include only the group known as the Encyrtinae by most modern writers, to the exclusion of the Eupelmidae, Signiphoridae and Aphelinidae which have been associated with the Encyrtidae by some authorities.

[2] The new genera and species mentioned will be described in an appendix to this paper.

(Holmgren).[3] This and another very similar species, both apparently endemic, may be known as *Coelopencyrtus swezeyi* and *odyneri* Timberlake.

In his supplement to the Hymenoptera of the Fauna Hawaiiensis, Vol. 2, Pt. 6, published nine years after the appearance of Ashmead's work, Dr. Perkins added nine species to the list, and in 1912 described *Echthrogonatopus hawaiiensis* as a new endemic species.[4]

During the following year, 1913, Mr. Fullaway described three new species from these Islands and records about five other unnamed species which had not been noted previously.[5] In 1914 he recorded still another species taken on Laysan Island under the name of *Ectroma* species.[6] This proves to be a *Xanthoencyrtus,* closely allied to two other species taken on Oahu, and will be described later as *X. laysanensis.* One of Fullaway's species, *Apentelicus kotinskyi,* proves to be the male of the species previously recorded under the name of *Microterys flavus,* and as there are slight but constant differences to separate it from Howard's species, it may be known hereafter as *Microterys kotinskyi* (Fullaway). It is possible that the true *flavus* is also established in the Islands, as I have seen a pair collected by Koebele on Hawaii. Mr. Fullaway also confused two species under his *Aphycus terryi,* one of which I have made the type of the genus, *Pseudococcobius.* His supposed male of *terryi* proves to be another species of *Xanthoencyrtus* which may be known as *X. fullawayi* Timberlake. With these corrections we find that twenty-five species of Encyrtidae have been recorded from the Islands up to the present time. In the last few years several other species have been collected or identified from earlier material so that now some forty-odd species are known to occur, or at least to have been collected here once, since the list includes two immigrant or

[3] Hawaiian Sugar Planters' Experiment Station, Ent. Bull. 5, p. 52, pl. 6, fig. 6.

[4] Hawaiian Sugar Planters' Experiment Station, Ent. Bull. 11, p. 17.

[5] Ann. Rep. Hawaii Agric. Experiment Station, for 1912, pp. 26-28; and Proc. Haw. Ent. Soc., Vol. 2, No. 5, p. 281.

[6] Proc. Hawaiian Ent. Soc., Vol. 3, No. 1, p. 21.

introduced species and possibly three or four which apparently failed to become established.[7]

Sources of the Hawaiian Encyrtidae.

The family is represented in the endemic fauna by species belonging in at least five genera, of which *Anagyrus* Howard has about a dozen to fifteen species falling in a rather distinct group almost worthy of generic distinction. *Xanthoencyrtus* Ashmead has three or possibly more species, none of them having been hithertofore described and only one recorded under the name of *Ectroma* species. *Echthrogonatopus* Perkins has at least three species, *E. hawaiiensis* Perkins, *E. molokaiensis* (Ashmead) and one undescribed. The two remaining genera are represented by one or two species each, and are of unusual interest because of the structural peculiarities in the male sex. The first of these interesting and probably wholly endemic genera is *Coelopencyrtus* Timberlake with two species parasitic in the larvae of *Odynerus,* one of which as already stated Mr. Swezey has noted and figured under the name of *Ageniaspis* species. The other genus and species is *Nesencyrtus kaalae* (Ashmead), of which Dr. Williams has reared a large series from the larvae of *Nesoprosopis pubescens* Perkins taken from an old rotten log near the Volcano House at Kilauea, Hawaii. in February, 1918.

The immigrant and introduced species belong in about twenty genera and have come mostly from the Oriental and Australian regions apparently, although at least three were introduced from North America, these being *Helegonatopus pseudophanes* Perkins, *Saronotum americanum* Perkins and *Aphidencyrtus schizoneurae* (Ashmead). Cameron's species *Bothriencyrtus insularis* is of uncertain origin although judging by the descripttion it seems to be an ally of *Bothriencyrtus planiformis* (Howard) of California, which is the type of this new genus.

[7] These four species are *Bothriencyrtus insularis* (Cameron), *Homalotylus flaminius* (Dalman), *Microterys flavus* (Howard) and *Comperiella bifasciata* Howard.

The following species are assumed to have come from the Oriental, Polynesian or Australian regions, judging from their known distribution, the range of their closest allies, or the distribution of their hosts or food-plants of the hosts. *Blepyrus mexicanus* Howard, although described originally from Mexico, Texas and the Hawaiian Islands, I have seen from Manila, Philippine Islands, and Mr. P. Van der Goot has informed me that it also occurs in Java. Its host, *Pseudococcus virgatus* (Cockerell) is known from Mauritius, Ceylon, India and the Philippine Islands and undoubtedly has a wide range throughout the Orient, whence it was probably introduced together with its parasite into the Hawaiian Islands as well as into the warmer parts of America.

Pauridia peregrina Timberlake, a somewhat close ally of *Blepyrus,* is the species recorded by Mr. Fullaway under the names of *Anagyrus* species and *Encyrtus* species parasitic on *"Pseudococcus citri."* I have studied specimens of this species collected at Amoy, China, by Mr. C. P. Clausen, in Fiji by Mr. Muir, in California by Mr. H. S. Smith, and have also seen the characteristic wing mounted on a slide with another Encyrtid from Manila, Philippine Islands. Its host, *Pseudococcus krauhniae* (Kuwana)[8] was described from Japan and is presumably of Oriental origin. This parasite may have been brought in with its host from the Orient years ago, or possibly it was introduced from China by Compere in about 1908.

Tanaomastix abnormis (Girault) was first introduced and liberated in large numbers about Honolulu during the winter of 1915-1916, and additional colonies were turned out later. Its establishment was considered doubtful for a time because of the usual scarcity of its regular host, *Pseudococcus krauhniae* (Kuwana). Recently, however, it has shown its adaptability to local conditions, as Mr. Rosa has reared a few specimens

[8] This is the species referred to in the literature on Hawaiian Coccidae as *Pseudococcus citri,* but I have recently discovered that our species is really *P. krauhniae* (Kuwana), in accordance with the distinctions brought out by Ferris (The California Species of Mealy Bugs, Stanford University Publications, University Series, 1918, p. 37, 45, pl. 1, fig. 8).

from *Pseudococcus virgatus* (Cockerell), collected in November, 1918, on the grounds of the Sugar Planters' Experiment Station. The species has thus become established from material received from California, whither it was brought originally from Sicily. It seems doubtful that the species is endemic in southern Europe, however, for its present known distribution is becoming cosmopolitan. Mr. J. R. Horton has informed me by word of mouth that the species occurred in Louisiana before its introduction into California (the determination, I believe, being by Mr. Girault), and I have previously recorded the species from Okitsu, Japan. It is now my good fortune to be able to add Brisbane, Queensland, to its known distribution, from specimens collected by the late E. J. Vosler. On the whole, therefore, I am inclined to believe in its Oriental, or possibly Australian origin, instead of South European.

Encyrtus infelix (Embleton) is now known to be widely distributed over the world and probably has followed its host, *Saissetia hemisphaerica* (Targioni Tozzetti), into most regions where the latter has penetrated. It would be impossible now to point out the original home of either the parasite or its host with exactitude, yet I believe this must have lain somewhere in the tropics of the Old World and probably in the Asiatic region. In addition to the localities recorded in the last number of our Proceedings from which I have seen this species, I have identified the species since from Rewa, Fiji (F. Muir); Brisbane, Queensland (E. J. Vosler); Tutuila, Samoa, near center of island (H. C. Kellers); and Manila, Philippine Islands (Geo. Compere).

A second species of *Encyrtus,* very closely allied to *E. bicolor* (Howard) but distinct in its much darker coloration and longer beard on the cheeks, has been present in the local collections for several years. This species, which may be known as *Encyrtus barbatus* Timberlake was collected in Honolulu by Alexander Craw in March, 1905, his specimens having been reared from *Saissetia hemisphaerica* on ferns, and more

recently Mr. Fullaway has reared a series from *Saissetia nigra* (Nietner) on ferns at Honolulu. *Barbatus* has been collected also by Mr. Muir at Pekalongan, Java, and on Larat, and by Compere at Manila, so that it presumably was brought here from some part of the Oriental or Indo-Malayan region.

In the collection of the Board of Agriculture and Forestry there is a single specimen of *Homalotylus flaminius* (Dalman) collected years ago on the Island of Oahu by Koebele. In a revision of the species of *Homalotylus,* which I hope will be published soon in the Proceedings of the U. S. National Museum, I have referred all forms of the *flaminius* type from Europe, Africa, Asia, and Australia to one species, to which our local specimen belongs rather than to the North American species. It is therefore likely that the species was an accidental introduction from the Orient or Australia, and as it has not been found in recent years it apparently failed to become established.

Quaylea aliena Timberlake is another species which I believe originated in the Old World and possibly in Australia. It is very closely related to a species common in California which has been described recently by Mr. Girault as *Cerchysius whittieri* and which is the type of my new genus *Quaylea. Quaylea whittieri* is the same species, I am almost positive, which Ashmead called *Hemencyrtus crawii* but did not describe, although it has been mentioned in the literature several times under that name by Isaac, Berlese and Silvestri; and under the name of *Cerchysius* species by Prof. H. J. Quayle and myself. If, as I suppose, it is the *Hemencyrtus crawii* mentioned by Berlese and other writers it was purposely introduced into California from Australia as a parasite of the black scale, *Saissetia oleae* (Bernard), although it has since proved to be a hyperparasite. Our local species, being closely allied and having the same habits, probably also came from Australia or some part of the Orient. It was recorded by Fullaway in 1913 as *Hemencyrtus* species, and possibly also under the name of *Encyrtus* species on *Saissetia hemisphaerica* and *Coccus*

viridis (Green). It has been reared at Honolulu from several Coccids as a parasite of *Scutellista cyanea* Motschulsky and *Tomocera californica* Howard.

Among our immigrant Encyrtids are two species of *Aphycus* which have escaped being recorded hithertofore. The most common species is *Aphycus alberti* Howard, which was described from Sydney, New South Wales, and has since been recorded from Southern California. As it is parasitic in the widely distributed *Coccus hesperidum* Linné, and in closely allied species, it presumably has a much wider distribution than is known at present, and its place of origin will hardly ever be determined exactly. Without much question, however, it originated somewhere in the warmer regions of the Old World and not necessarily in Australia, whither it may have been introduced as well as into these Islands and California. *Alberti* has been found here only recently, as apparently the first specimen was reared by Mr. Swezey from *Coccus longulus* (Douglas) on velvet bean from the Experiment Station grounds in October, 1914. The other species is *Aphycus claviger* Timberlake, described from Auckland, New Zealand. Nothing is known of the habits of this species but as it is a close ally of *alberti* it may have similar habits. The local record is based on a pair of specimens collected by the writer on a side spur of the main ridge leading up to Mt. Lanihuli, Oahu, on September 3, 1916. Three specimens were seen running about on a slender withe of a species of *Kadua*, one of which leaped away before it could be captured. The *Kadua* twig and surrounding shrubbery were carefully examined for the host of these parasites, but no coccids of any kind were discovered.

Microterys kotinskyi (Fullaway) and *M. flavus* (Howard) are species of almost certain Oriental origin. *Kotinskyi* is very closely allied to *flavus* which has been recorded from Ceylon and which I have seen also from Japan, as well as other species nearly identical from Fiji and the Philippine Islands. Our collections of *Microterys* from those parts of the world,

however, are much too meager to shed much light on the distribution, interrelationships and possible intergradations of the species or forms allied to *flavus*.

Aphycomorpha araucariae Timberlake was reared first in July, 1906, by Mr. Kotinsky from *Eriococcus araucariae* Maskell collected on the grounds of the Board of Agriculture and Forestry at Honolulu, his rearing being represented by four broken specimens. More recently Mr. Fullaway has reared a small series from the same locality and host, and I obtained a few specimens from the Moanalua Gardens in May, 1918. As the host and food-plant of the host in this case are both of Australian or New Zealand origin there can be but little doubt that the parasite also was derived from that part of the world

Comperiella bifasciata Howard was introduced at Honolulu in 1908 from the Orient, presumably from China, as noted by Kotinsky in the Hawaiian Forester and Agriculturist, Vol. 5, p. 148, July, 1908. A single specimen, however, was reared before that time in August, 1905, by Kotinsky from an *Aspidiotus* on *Bombax ceiba*. The species has never been taken since and its establishment here is therefore doubtful. It was recorded by Fullaway as *Cerapterocerus* species on *Aspidiotus*.

Anicetus annulatus Timberlake has been established in the Islands apparently for a considerable period of years, as it is widely distributed on Oahu and Kauai. It is nevertheless rarely taken and the specimens in the local collections are few in number. The earliest specimen that I have seen was reared by Mr. Fullaway, April 25, 1912, supposedly from *Saissetia hemisphaerica* (Targ.), but this host record is probably incorrect as all the subsequent reared specimens have come from *Eucalymnatus tessellatus* (Signoret). I hardly question the Oriental origin of *annulatus* although no specimens from that part of the world have come to hand. The genus, moreover, seems to have originated in the warmer parts of the Old World, as the three species described previously by Howard and Girault were collected in Ceylon, China and Queensland respectively.

There are also two species of Encyrtidae parasitic on *Pseudococcus saccharifolii* (Green) in the Islands, which were almost unquestionably brought in with their host. Neither of these parasites have been found elsewhere, but as their host has a known distribution in India it seems likely that both Coccid and parasites were introduced in importations of sugarcane from some part of the Orient. The more abundant one of these parasites, *Pseudococcobius terryi* (Fullaway), has been found on Hawaii, Maui and Oahu and probably occurs on Kauai, as it is apparently distributed throughout the Islands wherever its host is found. The other parasite, *Xanthoencyrtus fullawayi* Timberlake, is much rarer, and I have seen only two female specimens. One of these, which may have been the type of Fullaway's description of the supposed male of *terryi*, was found in a vial without data together with specimens of *terryi*. The second specimen was reared from material of its host collected by Mr. Swezey in August, 1916. at Pahala, Hawaii.

Adelencyrtus odonaspidis Fullaway is a species of which we have no direct clew as to its place of origin. Its host, *Odonaspis ruthae* Kotinsky, has not been found elsewhere, but its food-plant, *Cynodon dactylon*, is known to be indigenous in the warmer parts of Europe and Asia although now spread throughout the world. It is quite possible, therefore, that both host and parasite may some time be traced back to some part of the Orient, although they may have reached the Islands from some intermediate station.

Concerning the origin of at least two other species of our Encyrtidae we have as yet even less knowledge. *Anagyrus*, which is represented in the endemic fauna, has also one or possibly two, introduced species. One of these, the large brown species with black antennae, which may be known as *Anagyrus nigricornis* Timberlake, does not seem to have been recorded hithertofore. It is widely spread on Oahu in both the lowlands and mountains, and I have seen specimens from Kauai. It has therefore been in the Islands for a considerable number of

years, although the earliest specimen I have seen was taken by Mr. Swezey as late as March, 1910. The species undoubtedly has a wide range of hosts, and probably parasitizes many of our endemic species of mealy bugs. I have reared it from *Pseudococcus gallicola* and *montanus* Ehrhorn, and have found it associated with *Trionymus insularis* Ehrhorn. I have also reared it experimentally from the introduced *Pseudococcus longispinus* (Targioni Tozzetti) and *P. lounsburyi* Brain, and in the Board of Agriculture and Forestry collection is a series of specimens reared by Mr. L. V. Lewis from *Ripersia palmarum* Ehrhorn. Perkins in his supplement to the Hymenoptera of the Fauna Hawaiiensis claims that one or two species of *Anagyrus* were introduced by Koebele but gives no particulars as to the time of introduction or the source of the material. *Nigricornis,* therefore, possibly may have been introduced by Koebele although we have no definite proof in the shape of preserved material or written records. I have seen a similar, closely allied species collected by Mr. Muir in Fiji, which is the only clew to the origin of *nigricornis* that I can suggest

In 1913 Mr. Fullaway recorded another species of *Anagyrus* as *Encyrtus* species with banded antennae which I have named *Anagyrus swezeyi.* His host record, however, is incorrect, as this species is parasitic only in *Trionymus insularis* Ehrhorn so far as known, and there is no possibility of its being parasitic in *Saissetia.* This parasite is common through the lowlands of Oahu, and I have seen specimens from Lihue, Kauai, and Lupe Ditch, Maui. Most likely it is present also on the other large Islands, as no effort has been made to discover its distribution outside of Oahu. I am inclined to believe that it has been present in the Islands for many years and it may possibly be endemic since it is much more closely allied to the unquestionably endemic species of *Anagyrus* than is *nigricornis,* and resembles them in many particulars.

Means of Introduction of Immigrant Species of Encyrtidae.

There are published records of the intentional introduction of only two of our Hawaiian Encyrtidae, namely *Tanaomastix abnormis* (Girault) and *Comperiella bifasciata* Howard, the latter of which was found here before its liberation but has not been seen since. The introduction of *Paracopidosomopsis truncatella* (Dalman), and a *Chalcaspis* species has been reported upon also by Koebele and Craw, but neither of these parasites has been recovered. It is probable that *Anagyrus nigricornis* Timberlake was introduced by Koebele, and *Pauridia peregrina* Timberlake may have been brought from China by Compere although we have no definite information on these introductions. As far as we actually know none of our other Encyrtids was intentionally introduced, and probably most of them arrived in importations of plants before the days of strict quarantine. *Aphidencyrtus schizoneurae* (Ashmead) might have been brought in importations of cabbage or other vegetables from California, and in fact Mr. Fullaway has informed me that several of our Aphidid parasites and hyperparasites were intentionally allowed to escape from material received here in such a manner. Two others of our Encyrtidae, *Helegonatopus pseudophanes* Perkins and *Saronotum americanum* Perkins, which are parasites of Dryinidae, were probably either accidentally or perhaps intentionally liberated, through ignorance of their true nature, from material sent to Honolulu from Ohio by Koebele in 1903. They are both known to have been reared at Honolulu from the Ohio material, and as they appeared in the cane fields a few years later it seems probable that they were introduced at that time.

Aids in the Establishment of Immigrant Species of Encyrtidae.

When an emigrant species of parasite reaches a new region it is of course a prerequisite for its establishment that it finds its customary host or one related closely enough to act as a substitute. All Encyrtidae so far as known are internal

parasites,[9] and some are notable for the peculiar adaptations to their host during their larval life. The habits of species throughout the whole family may in fact be considered highly specialized in regard to their host relationships. Many species indeed so far as we know seem to be confined exclusively to one species of host and may be called monoxenotic in habit. Others are known to attack and successfully parasitize two or more species of hosts generally belonging to the same or closely allied genera, and these parasites may be cited conveniently as polyxenotic in habit.

Among our immigrant species of Encyrtidae we know rather definitely that *Adelencyrtus odonaspidis, Anagyrus swezeyi, Aphycomorpha araucariae, Blepyrus mexicanus, Pauridia peregrina, Pseudococcobius terryi* and *Xanthoencyrtus fullawayi* are all monoxenotic. With the possible exception of *Pauridia peregrina* all of these species were introduced quite likely concurrently with their hosts, either at the first or subsequent arrivals of the latter in the Islands, and their establishment here was on that account more easily accomplished.

Anagyrus nigricornis, Aphidencyrtus schizoneurae, Aphycus alberti, Comperiella bifasciata, Encyrtus infelix and *barbatus, Helegonatopus pseudophanes, Microterys kotinskyi, Quaylea aliena, Saronotum americanum* and *Tanaomastix abnormis* are apparently all polyxenotic in habit. The establishment of such of these as were purposely introduced undoubtedly was aided by this habit, and this was true probably of most of the other species. Some of them presumably were brought in concurrently with the host or hosts which they now attack, but this is not necessarily true of all, and in fact can not possibly be true of some.

Peculiarities in the life-history and habits of parasites may also play a large part in aiding or hindering their introduction and establishment in a new environment. Thus *Pauridia peregrina* and *Blepyrus mexicanus* are known to deposit their eggs

[9] The only exception is *Aphycus hesperidum* which Mercet claims is an external parasite of *Chrysompholus dictyospermi* var. *pinnulifer*, but I am strongly inclined to believe that the record is based on an error of observation.

in newly hatched larvae of their hosts, and *Blepyrus* indeed apparently never attacks the later stages although issuing from nearly full-grown hosts. It is at once obvious that Coccids in their earlier stages might more easily escape the attention of the careful plant-grower or importer and thus be allowed to become established in a new locality. If some are parasitized the establishment of both host and parsite is thus accomplished at the same time.

Parthenogenesis has also played a large part without much doubt in helping the establishment of certain of our immigrant species. As a general rule it may be stated quite confidently that all Encyrtidae, and for that matter most if not all Chalcidoidea, in so far as their habits have been investigated, are able to reproduce parthenogenetically under stress of necessity. Probably most species of Encyrtidae produce only males when the reproduction is parthenogenetic, and in case of the usual method of reproduction they produce in different species a variable proportion of both males and females. Before studying the habits of our local species I had never verified the existence of any other method of reproduction among the Encyrtidae, and was surprised to find that certain of our species are regularly thelyotokous in reproduction. In *Adelencyrtus odonaspidis, Blepyrus mexicanus, Encyrtus infelix, Pauridia peregina* and *Saronotum americanum* thelyotoky is the regular means of reproduction and males are rarely produced, being in fact entirely unknown in case of *Adelencyrtus* and *Saronotum*. I have reared the *Pauridia* through many generations without finding any males, and have in fact seen but a single male reared by Mr. Ehrhorn several years ago. I have likewise reared *Blepyrus* through several generations and was able to find males of this species only by examining some bean vines at the Sugar Planters' Experiment Station at a time when both host and parasite were unusually abundant. Of *Encyrtus infelix* I was fortunate enough to rear a single male in a small series obtained in 1916, and this is the only male specimen that I have seen out of numerous specimens examined from various parts of the world. Miss Embleton in her work

on this species states that the males are excessively rare, only one occurring to about a thousand females. The existence of this habit of thelyotoky is obviously a great advantage to a species invading a new region, since it might become established under favorable conditions from a few females or even from a single specimen. Conversely the arrhenotokous habit of reproduction may act disadvantageously before a species is well established, since the rapid dispersal which usually takes place will tend to increase the difficulties of the sexes finding each other, and thus restrict the necessary fertilization of the females.

In conclusion we may summarize our knowledge of the local Encyrtid fauna somewhat as follows: The endemic fauna is represented by five genera with about twenty to twenty-five species. Eighteen genera of introduced Encyrtidae have been recognized already, with two or three species as yet unworked which may raise the number of genera to about twenty. The source of three species is undoubtedly North American, and the rest of the immigrant species presumably have arrived mostly from the Australian, Polynesian or Oriental regions, although we have no very definite clews to the origin of several. At least two and possibly four species having been collected years ago but not recovered since are probably extinct in the Islands. Only two species are definitely known to have been introduced intentionally, although several others may have been as the records of early introductions are fragmentary. About seven of the immigrant species are monoxenotic and eleven others are polyxenotic, the former having been introduced presumably concurrently with their hosts, the latter not necessarily so. Peculiarities in the habits and life history have had some influence on the introduction and establishment of the Hawaiian Encyrtidae, since oviposition in the earlier stages of the host, thelyotokous reproduction and the polyxenotic habits of certain species are obviously advantageous in the dispersal of the species into new regions.

Descriptions of New Genera and Species of Hawaiian Encyrtidae (Hymenoptera.)*

BY P. H. TIMBERLAKE.

The types of the following new species will be placed in the collection of the Hawaiian Entomological Society, and some of the paratypes will be retained by the writer for ultimate deposit in the U. S. National Museum.

ECTROMATINI.

Anagyrus nigricornis n. sp.

Female: Head shaped nearly as in *A. dactylopii* (Howard) or *A. pseudococci* (Girault), being moderately thin fronto-occipitally with the dorsal surface well rounded; frontovertex nearly twice as long as wide at the posterior ocelli; the ocelli arranged in an equilateral triangle or nearly so, the posterior pair nearly their own diameter from the eye-margins and about twice as far from the occipital margin; eyes rather large, broadly oval, somewhat diverging anteriorly; face and cheeks not over one-half as long as the eyes; the scrobes forming narrow sulci slightly converging above. Antennae inserted close to the clypeal margin; scape broadly expanded beneath with its lower margin nearly uniformly rounded, about one-half as wide as long; pedicel nearly equal to the first funicle joint; funicle cylindrical, increasing slightly in thickness distad with the joints becoming successively shorter, the first three times as long as wide, the sixth a little longer than wide; club oval and nearly as long as the last three funicle joints combined.

Pronotum arcuate, the posterior margin acutely emarginate medially; posterior margin of the mesoscutum sinuate on each side of the middle. Abdomen as long as the thorax, the ovipositor not protruded.

Wings broad, reaching well beyond apex of abdomen; marginal vein fully thrice as long as thick and nearly equal to the slender stigmal, the postmarginal a little longer than the stigmal; speculum broad and widely separated from the posterior margin of the wing.

Sculpture finely granular-alutaceous, finer on the mesopleura, slightly coarser on the abdomen, the venter becoming smoother at apex. Eyes with a short, thick, blackish pile; head and thorax covered with a rather thick, appressed, subsquamous pubescence of short, white hair;

*These descriptions were prepared as an appendix to the preceding paper. Records are brought up to date of publication.

the sides and venter of abdomen clothed with a moderately long, soft, whitish pubescence.

Length: 1.09 to 2.0 mm.

Head dull yellow, the cheeks brownish to blackish, the center and lower part of occiput black; thorax brownish yellow, often darker or becoming decidedly brownish on the axillae and scutellum; propodeum, metapleura and abdomen more or less dark brown or brownish black. Antennae black, the scape with an annulus at base near the radicle joint and an oblique band before the apex white. Legs paler yellowish than the body, the coxae pale brown, the upper margin of the front and hind femora and tibiae often slightly brownish, the apex of the last joint of the tarsi dark brown or blackish. Wings hyaline, the veins dark brown.

Male: Head considerably thinner than in the female; the eyes much smaller and not greatly longer than wide; frontovertex a little wider than long; the ocelli in an obtuse-angled triangle, the posterior pair fully their own diameter from the eye-margins and about one-third as much removed from the occipital margin; face and cheeks proportionately longer than in the female; the scorbes in the form of short, parallel sulci reaching to the middle of eyes. Antennae inserted much more remotely from the clypeal margin or on a level with the lower corners of the eyes; the scape much shorter and narrower, being about a third as wide as long; pedicel hardly longer than thick; flagellum cylindrical, not thickened distad; the funicle joints incised on the upper side at the articulations, the first joint about four times as long as thick, the following joints somewhat shorter; each joint with a full whorl of long hair at the base and a half whorl at apex on upper side; club solid, as long as the last two funicle joints combined, pointed at apex, with hardly verticillate hair gradually shortening towards apex, the lower margin on basal half set with a row of five short, clavate hairs.

Abdomen smaller, depressed and plane above, the venter with a median plica. Wings shorter and proportionately wider, the marginal vein much shorter or about one-half as long as the stigmal. Pubescence of face somewhat thicker, that of the frontovertex a little longer and more erect.

Length: .69 to 1.29 mm.

Head yellow, the frontovertex orange yellow with the ocellar region more or less black; face with a more or less distinct, narrow, transverse brownish band between the lower corners of the eyes; scrobes, ventral margin of the cheeks and most of the occiput black; dorsum of thorax, metapleura and abdomen brownish black, the mesonotal sutures laterally more or less yellowish; mesopleura and sternum brownish yellow, the propleura brighter yellow. Legs and wings as in female; the antennae blackish with apical half of the flagellum often yellowish brown, the basal third of the scape and lower margin at apex white, the two pale areas often connected along the lower margin on the inner side.

Described from 22 females, 19 males (type, allotype and paratypes) all except one pair taken at various localities on Oahu at all elevations (Swezey and Timberlake); one pair (paratypes) taken on Puu Kapele, Kauai (Swezey). The type and allotype were reared experimentally from *Pseudococcus lounsburyi* Brain from a female captured on Kaumuohona, Oahu (Timberlake). It has been reared experimentally also from *Pseudococcus longispinus* (Targ.) and under natural conditions from *P. montanus* Ehrhorn, *P. gallicola* Ehrhorn and *Ripersia palmarum* Ehrhorn. It has been found associated also with *Trionymus insularis* Ehrhorn on *Eragrostis variabilis*. The oldest specimen seen is a female taken in Honolulu, Mar. 10, 1910 (Swezey).

Anagyrus swezeyi n. sp.

Female: Head subhemispherical, rather thin fronto-occipitally, the curvature seen in side view nearly uniform from occipital to oral margin, the outline in frontal view nearly circular, with the eyes somewhat protuberant below; frontovertex about a fourth longer than wide; ocelli in a right-angled triangle, the posterior pair about one-half more than their own diameter from the eye-margins and about one-half as far from the occipital margin; eyes rather narrowly oval, a little wider and very slightly diverging anteriorly; face slightly inflexed and concave below the middle of the eyes, the scorbes in the form of two narrow, deep grooves converging above but not nearly meeting; cheeks short or about equal to the width of the eyes. Antennae inserted close to the clypeal margin; scape compressed and about one-third as wide as long excluding the radicle joint, its lower margin uniformly rounded; pedicel slender and as long as the first funicle joint; funicle slender, cylindrical and increasing slightly in thickness distad, the first joint about three times as long as thick, the following joints about equal and a third shorter than the first; club a little thicker than the funicle, and as long as the two preceding joints and one-half the fourth combined.

General form of body slender and somewhat elongate; pronotum arcuate; posterior margin of the mesoscutum slightly bisinuate on each side of the middle; scutellum not much longer than wide and rather acute at apex. Abdomen about a fourth longer than the head and thorax combined, very narrowly triangular as seen from above; ovipositor sheaths shortly protruded.

Wings reaching slightly beyond apex of abdomen, narrow; marginal vein about twice as long as thick and nearly as long as the stigmal, the latter short and straight, with short, narrow spur at apex, the postmarginal vein very short; discal ciliation very dense, the speculum very oblique and narrow and broadly interrupted below the middle.

Head, pro- and mesonotum opaquely alutaceous; the propodeum and pleura less opaque and microscopically granular-reticulate, the abdomen somewhat more coarsely granular-reticulate, the ventrites much smoother and more or less polished especially on the last segment. Eyes with a short, thick brownish pile; head, notum, metapleura and sides of abdomen covered with a thick, appressed, short white pubescence.

Length: 1.11 to 1.57 mm. (or 1.66 with abdomen distorted).

Head yellow ocher (Ridgway), the clypeal margin, cheeks and postorbital margin paler; a small dot between eyes and base of antennae, the occiput except dorsally and centrally, and the occipital margin of cheeks black; pro- and mesonotum clove brown (Ridgway) often suffused with yellowish on the sides of the scutum and at apex of scutellum; propodeum nearly black; pleura and sternum yellow ocher, the propleura paler yellowish, the metapleura dusky; prepectal plate and tegulae mostly white; abdomen clove brown, more yellowish brown within the dorsal concavity at base, the sides sometimes suffused with yellowish above, the ventrites when exposed in distorted specimens brownish yellow. Radicle joint of antennae black; the scape white, with a very narrow annulus close to base, a broad oblique band at the middle and the extreme apex black; basal half of pedicel and first funicle joint black, rest of pedicel and next two funicle joints white, last three funicle joints blackish brown, the fourth often paler or even whitish at base; club pale yellow. Legs nearly concolorous with the mesopleura or a little paler, the last joint of the tarsi blackish. Wings hyaline, the veins brown.

Male: Head much thinner than in the female; the eyes much smaller, frontovertex nearly twice as wide as long; the ocelli in a slightly obtuse-angled triangle, the anterior ocellus close to anterior margin of the frontovertex, the posterior pair nearly twice their own diameter from the eye-margin and somewhat less than half as far from the occipital margin; cheeks and face considerably longer, the latter more deeply concave between the lower part of the eyes, the scrobes very shallow, rather indistinct and not convergent. Antennae inserted remotely from the clypeal margin on a level with the lower corners of the eyes, scape proportionately nearly as long as in female but much narrower, being nearly linear; pedicel hardly longer than thick; flagellum slender and cylindrical; first funicle joint about five times as long as thick, the following joints gradually shortening, the sixth about three times as long as thick; club nearly as long as last two funicle joints, acute at apex and solid; the whole flagellum clothed with moderately long erect hair gradually shortening towards apex, arranged somewhat indistinctly in about six whorls on the first funicle joint, in four on following two joints, in three on the

last three funicle joints, and more scattered on the club; the under side of the sixth funicle joint set with a row of about eight or nine short, erect, clavate hairs including one or two on the base of the club.

Abdomen, depressed, triangular, cordate at base and truncate at apex, the ventral plica strongly developed. Wings relatively wider than in female, the disk considerably less densely and more coarsely ciliated.

Head very finely rugosely reticulate on the face and slightly more coarsely rugulose on the frontovertex; mesopleura minutely reticulate; the first tergite of abdomen with much more evident and coarser reticulations than in the female. Head much less pubescent, the face and cheeks with only a sparse pubescence, the frontovertex narly bare; the abdomen entirely free from the white, appressed pubscence of female, and with only a few scattered, soft hairs on the dorsum.

Length: .58 to 1.05 mm.

Head brownish black, slightly shiny, the facial ridge more brownish, face and clypeal margin below the antennae and most of the cheeks strontian yellow (Ridgway); thorax and abdomen black, the notum slightly shiny, the dorsum of abdomen with an iridescent luster. Antennae brownish black, the flagellum more brownish, the base of scape yellow. Legs pale yellow; the coxae fuscous except at apex; the front and hind tarsi somewhat brownish on the upper side, becoming darker at apex; the last two joints of the middle tarsi rather dark brown. Wings as in the female.

Described from 31 females, 38 males (type, allotype, and paratypes) from various parts of Honolulu, Oahu, either reared from *Trionymus insularis* Ehrhorn or swept from Bermuda grass on which the mealybug is commonly found (Swezey and Timberlake); 9 females, 11 males (paratypes) reared from the same host on *Sporobolus,* Oahu Plantation, Oahu; one pair (paratypes) swept from Bermuda grass at Lihue, Kauai (Timberlake); and one female (paratype) from Lupe Ditch, 1200 feet, Maui (Giffard and Fullaway). The oldest specimen seen is a male (paratype) collected at Waialua, Oahu, Aug. 24, 1910 (Swezey).

Xanthoencyrtus apterus n. sp.

Female: Head somewhat wider than thorax, very thin fronto-occipitally, the face and frontovertex lying in one plane, as seen from in front nearly circular; occiput concave above, with the neck inserted considerably above the center; space between the eyes from the antennal sockets to the occipital margin a little longer than wide, rather deeply concave with a triangular, raised area on the dorsal half, the vertex but little

narrower than the pronotum; ocelli very small, probably not functionable, arranged in a small, obtuse-angled triangle, the posterior pair close to the occipital margin and their distance apart equalling the distance to the eye-margins; the latter acute; eyes elonagte oval, lying parallel with the longer axis of head; cheeks about as long as wide, and as wide as the eyes. Antennae inserted slightly above the clypeal margin; the scape flattened but hardly expanded below, including the radicle joint about four times as long as wide; pedicel somewhat shorter than the first two funicle joints combined; and wider at apex than the following joint; flagellum cylindrical, increasing distinctly but not greatly in thickness distad; funicle joints all nearly equal in length, the first and sixth slightly longer, the first somewhat longer than wide, the last nearly as wide as long; club nearly as long as the three preceding joints combined, a little wider and rounded at apex, distinctly three-jointed, the first and third joints slightly longer than the second.

Thorax short and much depressed; pronotum but slightly declivous although prolonged and constricted towards the apex, the posterior portion transverse, and about two-thirds as long as the mesoscutum, its posterior margin but slightly arcuate; the mesoscutum twice as wide as its median length, its posterior margin perfectly truncate; axillae wider than long, acutely meeting medially; scutellum small, shorter than the mesoscutum, a little wider than long and broadly rounded at apex; propodeum very short in the middle and longer at the sides, the metapleura very small and obliquely transverse. Abdomen nearly twice as long as the head and thorax combined, acute at apex and somewhat wider at base than the thorax; the vibrissal plates situated half way or a little more from the middle towards the base and often concealed beneath the first tergite; ovipositor not protruded. Wings rudimentary, the front pair not reaching beyond the apex of the scutellum.

Surface of head, thorax and abdomen smooth and shining with a fine reticulation on the mesoscutum barely perceptible. Eyes with a short, sparse pile; head and thorax with a short dark-colored, inconspicuous pubescence that is nowhere abundant.

Length: .94 to 1.36 mm.

Head and thorax about yellow ocher (Ridgway) varying to tawny especially on the head; the underparts of the thorax and legs a little paler yellow; abdomen black or piceous, becoming brownish at the base of the first tergite; scape and pedicel concolorous with the face, the flagellum black, more dilutely at base, the first funicle joint appearing somewhat yellowish in balsam mounts.

Male: Head wider and shorter than in the female, being wider than long; space between eyes from the antennal sockets to the occipital margin about as wide as long, the face and frons concave as in the female but without the triangular elevation on the upper part; scape and pedicel very nearly the same, the flagellum much longer, cylindrical and not thickened distad; first funicle joint nearly four times as long as thick, the following joints gradually shortening, the sixth about twice

as long as thick; the club somewhat longer than the last two funicle joints combined, solid, and acute at apex; funicle with moderately long, verticillate hair, the first joint with four whorls, the following joints with three, the club with similar less distinctly verticillate hair gradually shortening towards apex; the last funicle joint set with a row of four short, clavate scale-like hairs on the under side, the base of the club with two more. Thorax and wings as in the female, except that the scutellum is slightly longer and a little acute at apex. Abdomen a little longer than the thorax, very broadly ovate or nearly circular in outline as seen from above, and very strongly depressed. Face very finely reticulate, mesoscutum more distinctly reticulate than in female, and the basal tergite of abdomen with a comparatively coarser reticulation.

Length: .69 to .88 mm.

Coloration distinctly more reddish, especially on the abdomen, which is not black as in the female; antennae and legs as in the female.

Described from 6 females, 3 males (type, allotype and paratypes) collected on *Eragrostis variabilis* at Nuuanu Pali, Oahu, Oct. 8, 1916 (Swezey and Timberlake) and 2 females, 2 males (paratypes) from the same locality, Nov. 12 and 19. 1916 (Giffard and Fullaway). The species is probably parasitic on *Trionymus insularis* Ehrhorn, as the grass on which the parasite was found is commonly infested with this Coccid.

Xanthoencyrtus laysanensis n. sp.

Female: Differing from *X. apterus* as follows: Head perfectly circular as seen from in front; the space between the eyes from the antennal sockets to the occipital margin as wide as long, the depression with a rather narrow median ridge on the upper part instead of a triangular raised area; the ocelli absent. Antennal scape somewhat expanded beneath and over a third as wide as long excluding the radicle; pedicel no wider at apex than the following joint; flagellum distinctly stouter and increasing but very slightly in thickness distad, the relative proportions of the funicle joints remaining about the same; club not distinctly wider than the funicle, its middle joint the shortest. Posterior margin of the pronotum somewhat more arcuate, making the mesoscutum slightly longer medially. No reticulations on the mesoscutum apparent under highest magnification of the Zeiss binocular.

Length: .90 to 1.35 mm.

Coloration the same as in *apterus*, the flagellum rather deeper black and not at all paler at the base of the funicle, the basal tergite of the abdomen somewhat more yellowish at base.

Male: Similar to the male of *apterus* with the scape a little wider, and the abdomen no longer than the thorax and much less circular.

Head and mesoscutum smooth and not reticulate, the basal tergite distinctly reticulate.

Length: .71 to .86 mm.

Coloration as in the female, not reddish as in *apterus*, the abdomen black.

Described from 3 females, 3 males (type, allotype and paratypes) collected on Laysan Island, December, 1912 (Fullaway).

Xanthoencyrtus semiflavus n. sp.

Female: Similar to *X. apterus* and differing as follows: Head a little wider, being considerably wider than the thorax and in frontal view distinctly wider than long; the space between the eyes from the antennal sockets to the occipital margin a little wider than long, with a transversely oval depression on the lower part somewhat above the antennae, the vertex fully as wide as the pronotum; ocelli rather more minute, the posterior pair distinctly more remote from the eye-margins than their distance apart. Antennae more nearly as in *laysanensis* in thickness or width; the scape considerably wider than in *apterus;* the pedicel not so distinctly wider at apex than the following joint; the flagellum stouter but increasing in thickness distad in about the same proportion, the first funicle joint relatively longer, the apical funicle joint slightly wider, the last two being as wide as long; the club as in *apterus* Thorax and abdomen about as in *apterus,* the scutellum rather more acute at apex, the ovipositor slightly protruded. Sculpture smooth, with no reticulations apparent on the mesoscutum.

Length: 1.38 mm.

Coloration similar to *apterus* except that the abdomen is not yellowish at base although somewhat brownish, the funicle yellow instead of black, with the last joint somewhat dusky and the club black, the tarsi yellowish white and distinctly paler than the rest of the legs.

Male: Unknown.

Described from 1 female (type) collected on the southern slopes of Diamond Head, Oahu, in the spring of 1917 (Fullaway).

Xanthoencyrtus fullawayi n. sp.

Female: Head very thin fronto-occipitally, seen from in front nearly circular, the entire anterior or dorsal aspect lying in one plane; the occiput strongly concave above with the neck inserted far above the center; space between the eyes from the antennal sockets to the occipital margin about a fifth longer than wide, and very slightly convex from

side to side; ocelli well developed, arranged in a very obtuse-angled triangle, the anterior ocellus somewhat closer to the occipital margin than to either of the posterior ocelli, the latter almost touching the occipital margin and about equidistant from the anterior ocellus and the eye-margins, being remote from the latter; occipital margin acute; eyes subovate, somewhat elongate, being broadest anteriorly; cheeks strongly narrowed towards the mouth, as long as wide at base, which equals the width of the eyes. Antennae inserted slightly above the clypeal margin and a little farther apart than in *apterus;* the scape not flattened but moderately thickened, being thickest a little beyond the middle, the under side somewhat furrowed towards the apex; pedicel slightly longer than the first two funicle joints combined; flagellum cylindrical and slightly clavate; first funicle joint distinctly longer than thick, the following increasing gradually in size, all somewhat transverse and shorter than the first joint; club as long as the last five funicle joints combined, a little wider than the sixth, somewhat acute at apex, and distinctly two-jointed, the first joint about one-half as long as the second.

Thorax very strongly depressed and longer than in *apterus;* pronotum long at the sides but not prolonged anteriorly into a neck, its posterior margin with a very deep angular emargination at the middle; mesoscutum as wide as its median length, the portion lying behind a line drawn between the posterior corners of the pronotum transverse and as narrow as the same area in *apterus,* its posterior margin perfectly truncate; axillae strongly narrowed and meeting within, prolonged and narrowed on the sides posteriorly, their scutellar margin somewhat arcuate; scutellum large, as wide as long, posteriorly triangular with the apex rounded; propodeum very short at the middle and much longer at the sides; the metapleura subtriangular and moderate in size. Abdomen a little wider than the thorax and nearly a third longer again, widest at the middle, strongly narrowed posteriorly with the apex rounded; the vibrissal plates located at or considerably before the middle, with the vibrissae not conspicuous; ovipositor not protruded.

Wings fully developed, rather narrow and reaching beyond the apex of the abdomen; the disk uniformly ciliated to the base, the speculum rather wide, reaching from the base of the stigmal vein very obliquely towards the posterior margin, connected there with a submarginal basal hairless streak, and indistinctly divided just below its middle; marginal cilia short; the nervures reaching nearly to the middle of the wing, the marginal vein thick, a little longer than wide, the postmarginal almost absent, the stigmal a little longer than the marginal, constricted at base and enlarged somewhat triangularly at apex. Legs showing no marked peculiarities, the tibiae and tarsi slender and cylindrical, the middle tibial spur no longer than the first tarsal joint.

Head and thorax smooth and somewhat shining, the face and frons finely and somewhat sparsely punctate, the mesoscutum with similar slightly closer punctures, the pronotum duller, with punctures not so distinct, scutellum smoother with the punctures fainter and sparser;

tergites of abdomen with a very fine, delicate reticulated surface sculpture.

Eyes with a short, rather sparse pile; the pubescence on head and thorax short, yellowish, rather sparse and not conspicuous.

Length: 1.07 to 1.23 mm.

Coloration of body uniformly yellow, nearly ochraceous orange (Ridgway), the underparts of thorax and the legs paler yellow, the apex of the last joint of the tarsi blackish; antennal scape and pedicel fuscous, becoming testaceous at apex of the latter, flagellum darker or inclining to blackish; wings hyaline with the veins fuscous.

Described from a female (type) reared Sept. 2, 1916, from *Pseudococcus saccharifolii* (Green) from Pahala, Hawaii (Swezey), and another (paratype) found in a vial with a specimen of *Pseudococcobius terryi* (Fullaway) without data. This specimen may be the type of Fullaway's description of the supposed male of *terryi*.

Pauridia n. g.

Female: Head in frontal view nearly circular in outline, in side view subtriangular, with occipital side much the longest, the dorsal side the shortest and rounded; the facial and occipital sides forming an acute angle at the mouth; head in other words strongly convex dorsally with the face abruptly reflexed; frontovertex about a half longer again than wide; ocelli in an obtuse-angled triangle, the posterior pair close to the eye-margins; eyes moderate in size, about a fourth longer than wide, and widest anteriorly, their long axis oblique to the plane of the frontovertex; occiput very slightly convex with the neck inserted near the center; face and cheeks long, the latter as long as the dorsal orbits of eyes; the face deeply hollowed out above to form the scrobes which nearly meet in an acute angle just below the facial angulation and separated below by a low, triangular prominence between the antennae. The latter inserted moderately far apart close to the clypeal margin; scape cylindrical and just reaching to the frons; pedicel twice as long as thick or nearly as long as the first four funicle joints combined; flagellum moderately clavate, and finely pubescent; first four funicle joints very small, short and transverse, and also much narrower than the apex of pedicel, the fifth a little larger and somewhat transverse, the sixth considerably longer and subquadrate; club large, oval, acute at apex, wider than funicle and as long as the five preceding joints combined, its three joints about equally long. Mandibles thick at base, rather short, narrow at apex with two short, equal, not very acute teeth. Maxillary palpi short, two-jointed, the basal joint no longer than thick, the apical nearly twice as long.

Thorax moderately convex, the scutum, axillae and scutellum in one

plane; pronotum arcuate; the scutum about a third wider than long; the axillae nearly meeting medially; the scutellum triangular, with apex slightly rounded, but slightly elevated and convex, its sides abruptly declivous; propodeum short or transversely linear. Abdomen as long as the thorax, triangular in dorsal view, acute at apex, with the dorsum deeply concave, and the sides strongly compressed; ovipositor issuing from apex, the sheaths not visible, the fifth ventrite reaching to apex; the vibrissal plates situated at the basal fifth.

Wings not long and rather wide; the marginal cilia short, the discal ciliation uniform and moderately thick; speculum much narrowed above and meeting the stigmal vein; submarginal vein much thickened just before its apex and very slender before the thickening; marginal vein a trifle longer than thick, the stigmal somewhat more than twice as long as the marginal and moderately enlarged at apex, the postmarginal tapering and nearly as long as the marginal. Hind wings narrow, with the costal cell absent.

Legs slender, of moderate length, showing no particular peculiarities, the middle tibiae longer than their femora, very slender at base and moderately thickened at apex, the spur slender and almost as long as the first joint of the tarsi; hind tibiae thicker than the middle pair, tapering towards the base, the apical spur short and slender.

Sculpture opaque and alutaceous on the frontovertex with very fine scattered punctures; very finely reticulate on the mesonotum, mesopleura and abdomen with microscopic setiferous punctures on the former. Pubescence fine and inconspicuous throughout.

Male: Very similar to the female differing chiefly in the antennae and abdomen. The former slightly longer and much less clavate; the pedicel but slightly longer than thick and a little shorter than the first two funicle joints combined; flagellum but slightly increasing in thickness towards apex with a very fine, minute pubescence as in the female; first four funicle joints as wide as the pedicel, as long as wide and equal to each other throughout; the next two joints increasing distinctly in size but remaining very nearly quadrate; club solid, ovate, acute at apex, but slightly wider than the funicle and a little longer than the two preceding joints combined. Abdomen very small, not over one-half as long as the thorax, much depressed and sub-triangular with the base and sides equal, the basal corners and apex bluntly rounded.

Genotype: *Pauridia peregrina* n. sp.

This genus is considerably like *Blepyrus* Howard (which is not a Mirine but an Ectromatine genus) in general form and appearance although quite distinct in the structure of the head, antennae and venation. In Ashmead's tables it runs to *Anagyrus* Howard which, however, it does not closely resemble.

In Girault's tables it runs to *Coccidoxenus* Crawford and *Fulgoridicida* Perkins, with neither of which is it closely allied, both of these genera falling more naturally in the Mirini.

Pauridia peregrina n. sp.

Female: Fifth funicle joint varying to hardly larger if any at all than the preceding joints although typically distinctly larger. Eyes with a fine, short, moderately thick pile; the frontovertex with a few longer scattered hairs, the mesonotum with more numerous similar hairs, the vestiture not conspicuous being dark-colored and nowhere abundant.

Length: .56 to .89 mm.

Black throughout, somewhat shining except on head, but hardly metallic; legs concolorous, all the tarsi except at apex, the trochanters, knee articulations, and apex of the middle tibiae yellow, the middle tarsi and tibial spur paler yellow; antennae dull black; wings hyaline, the veins fuscous.

Male: The only male seen is mounted on a slide and seems to be identical with the female throughout in coloration and structure except as brought out in the generic description.

Length: .79 mm.

Described from 74 females (type and paratypes) all reared from *Pseudococcus krauhniae* (Kuwana) or associated with this mealybug, Honolulu, Oahu (Timberlake); 1 female (paratype), Waiamao Valley (part of Palolo), Oahu, Apr. 9, 1916 (Timberlake); 1 male, 4 females (allotype and paratypes) reared from mealybugs on pigeon peas, Honolulu, June 20, 1911 (Ehrhorn); 3 females (paratypes) reared from mealybug on *Cassia fistula,* Honolulu, Dec. 4, 1913 (Ehrhorn); and 1 female, Olowalu, Maui, May 15, 1918 (Giffard and Fullaway). Also from the following foreign material: 5 females (paratypes) reared from mealybug, Amoy, China (C. P. Clausen), California State Insectary No. 3306; 1 female (paratype), Fiji, 1905 or 1906 (F. Muir); and 7 females (paratypes) reared from mealybug, Alhambra, California, Nov. 1, 1918 (H. S. Smith), California State Insectary No. 3451.

This species is common in Honolulu, and in the several thousand specimens that I have reared no males have been detected.

ENCYRTINI.

Encyrtus barbatus n. sp.

Very closely allied to *bicolor* (Howard) and similar structurally except as follows: Face in the female distinctly transversely lineolate, the beard on the cheeks considerably longer and more conspicuous, the bristles on the sides of the abdomen and towards the apex somewhat longer and more prominent.

Female: Head shaped as in *bicolor* (Howard), *infelix* (Embleton) and allied species; the transverse carina separating the frons and face extending outward to the lower corners of the eyes, the middle portion of the median indentation of this carina curved slightly downward towards the mouth; the longitudinal carina on the cheeks and postorbital region, very distinct and extending considerably in front of the eyes; carina connecting the posterior ocelli straight or slightly arcuate; antennae, thorax, wings, legs and abdomen as in allied species.

Frontovertex finely, transvrsely lineolate with distinct, scattered and remote punctures; face more coarsely, transversely rugoso-lineolate and more or less reticulate on the median part, but becoming smoothish above within the indentation of the transverse carina; thorax finely granular alutaceous, with the propodeum smooth and polished except at the sides; the pro- and metapleura and abdomen delicately reticulate; the mesopleura microscopically reticulate or appearing smooth and polished under moderate magnification.

Frontovertex with a fine whitish scattered pubescence arising from the punctures, the face with a similar pubescence; cheeks with a beard of long, black, bristle-like hair, apex of clypeus and base of mandibles with somewhat shorter black hairs, posterior margin of the pronotum, and the mesoscutum rather densely covered with recumbent black hair changing to white on the posterior half of the scutum; axillae and tegulae with moderately long, black, bristle-like hair; base of the scutellum with a fine, soft, whitish pubescence with a few much longer pale-colored hairs in front of the apical black fascicle; sides of the abdomen with several very long black hairs besides the vibrissae, the apex with shorter whitish hair.

Length: 1.67 to 2.13 mm.

Head nearly raw sienna (Ridgway) but more or less infuscated especially on the frontovertex which becomes brownish to quite fuscous, the cheeks on and just below the carina black; pleura of thorax nearly pure raw sienna, always clearer yellowish than the head; notum of thorax about ochraceous orange (Ridgway) with the posterior margin of the pronotum, usually the anterior margin of the scutum, posterior half or more of the scutum and declivous portion of the axillae black, the basal margin of the scutellum often blackish; rest of the scutum more reddish

or about xanthine or Mars orange (Ridgway), forming a narrow, more or less arcuate transverse band on the anterior part; in paler specimens the band is wider or reaching practically to the anterior margin of the scutum, and the axillae and scutellum are entirely orange yellow; propodeum concolorous, somewhat dusky with a bright luster; abdomen shining blue black above with a strong luster, and with a greenish luster beneath. Antennae dark brown to black, the scape pale yellowish or whitish with its dorsal margin and the lower margin of the radicle joint black. Front and hind coxae, most of the front and middle femora and of the hind tarsi white or yelowish white; dorsal and ventral margins of the front femora, their tibiae and tarsi fuscous; middle coxae, upper side of middle femora and base of their tibiae blackish, the tibiae changing to brownish yellow at apex with the spur and tarsi concolorous; hind femora brownish yellow becoming blackish on the dorsal margin or almost entirely blackish, the hind tibiae and basal half or sometimes only the basal fourth or fifth of the first joint of their tarsi black; apex of the middle and hind tarsi blackish. Wings deeply infuscated with the usual hyaline area beyond the transverse fascicle of hair, the hind wings entirely hyaline; the veins fuscous, but the apical part of the submarginal vein hyaline, coterminous with the hyaline area of the disk.

Male: Quite dissimilar from the female in many respects. The head much thinner fronto-occipitally, with the eyes much smaller; carinae of the face, cheeks, and vertex entirely absent; frontovertex about twice as wide as long with the ocelli arranged in an extremely obtuse triangle, the median ocellus being hardly more than twice as far from the occipital margin as the posterior pair which are rather remote from the eyes. Antennae inserted higher up on the face; the scape short, flattened and widened towards apex; pedicel short or no longer than thick; flagellum cylindrical and slightly thicker than the pedicel; funicle joints nearly equal in length, about twice as long as thick, incised at the articulations and each with two whorls of long hair; club solid, nearly as long as the two preceding joints combined, tapering towards the acute apex, and clothed with long hair which gradually shortens towards the apex.

Thorax nearly as in the female, but the axillae much less elevated and not so strongly or abruptly declivous posteriorly; abdomen a little shorter than the thorax, strongly depressed, subtriangular with the sides equal and the basal corners and apex rounded. Wings without the transverse band of hairs on the basal half, the disk uniformly ciliated; the speculum widening towards the posterior margin and interrupted below the middle; marginal vein slightly longer than in the female, the postmarginal proportionately much longer, the stigmal, although by no means short, is relatively somewhat shorter than in the female, and hardly longer than half the postmarginal.

Sculpture as in the female, except that the head is granular alutaceous and opaque like the thorax. Pubescence on the face and frontovertex similar, but the black beard on the cheeks, clypeus and mandibles entirely absent; mesoscutum and axillae with short, recumbent black hair, the

posterior margin of the pronotum with similar whitish hair; scutellum with scattered black hair and a fine, silky, pale pubescence on the basal margin, the apical fascicle of hair very much shorter and sparser than in the female; abdomen provided with a fine, soft, sparse pubescence above, and with three long, bristle-like, blackish hairs on each side behind the middle, which shorten toward the apex; the vibrissae subbasal and very long.

Length: .91 to 1.45 mm.

Frontovertex deep chrome (Ridgway), face and cheeks creamy white; center of occiput and postorbital region connecting with a spot on cheeks next to the eyes black; notum of thorax ochraceous orange (Ridgway) with the pronotum except laterally, an oval to subtriangular mark on the anterior part of the scutum usually reaching about to the middle, more rarely to the base, sometimes the axillae medially and scutellum on basal margin, a spot on apex of scutellum sometimes connecting with the basal spot, the metanotum and the middle part of the propodeum black; abdomen black, with the lateral margins from the vibrissal plates to apex yellow. Antennae dusky yellowish, the scape pale yellowish with the lower margin at base including the whole radicle joint and the dorsal margin on apical half black, the base of pedicel blackish. Front legs, the middle legs except coxae, and the hind coxae and femora yellowish white; upper margin of the front femora dusky, their tibiae and tarsi slightly more brownish; the middle tibiae on basal half except at the extreme base somewhat fuscous; the middle coxae, apex of the last joint of the front and middle tarsi, dorsal margin of the hind femora except at base, and the hind tibiae and tarsi black. Front and hind wings entirely hyaline, the veins very pale or dilutely fuscous.

Described from 1 female, 4 males (type, allotype and paratypes) reared from *Saissetia hemisphaerica* (Targ.), on ferns, Honolulu, Oahu, March, 1905 (Alexander Craw); 7 females, 6 males (paratypes) reared from *Saissetia nigra* (Nietner) on ferns, Honolulu, Nov., 1917, to Feb., 1918 (Fullaway); 1 pair (paratypes), Palolo Valley, Oahu, Dec. 26, 1914 (Swezey); 2 females (paratypes), Honolulu, Oct. 10, 1915, and Dec. 10, 1917 (Swezey, Timberlake); 7 females (paratypes) from *Saissetia hemisphaerica* on coleus, and 3 females, 5 males (paratypes) from *Saissetia nigra* on ferns, Honolulu, May 6-18, 1919 (Timberlake).

Also from the following foreign material: 1 female, 1 male (paratypes), Manila, Philippine Islands (G. Compere); 4 females (paratypes), Larat, Dec., 1907 (F. Muir) and 1

female (paratype), Pekalongan, Java (F. Muir). The specimens from Java and Larat have the first joint of the hind tarsi black only at the base, and the hind femora are variable in the extent of infuscation as in the local specimens.

MIRINI.

Bothriencyrtus n. g.

Female: Head moderately thin fronto-occipitally, subhemispherical, the curvature as seen in side view nearly uniform from oral to occipital margin with the eyes anteriorly somewhat protuberant, and facial outline sinuate; in frontal view appearing considerably wider than long, the frons and each eye about equally wide, the occipital margin transverse, the cheeks rounded and convergent towards the broad and truncate oral margin; occiput rather deeply concave, its dorsal margin sharply angled with the vertex; frontovertex flattened, a little longer than wide, the ocelli in an obtuse-angled triangle, the anterior one considerably behind the center, the posterior pair almost touching the occipital margin and a little more than their own diameter from the eye-margins; eyes very broadly oval, broadly rounded at each end, their long axis parallel with the plane of the frontovertex; cheeks not short, and as seen in side view of head wide; face as broad as long, slightly hollowed out, with the upper limit of the concavity gradually passing into the contour of the frontovertex between the anterior corners of the eyes, just below with a shallow but distinct transverse groove connecting the extreme anterior inner corners of the eyes, on each side a rather sharp carina descending towards the mouth from the eyes, the antennal scrobes forming rather deep grooves, hardly convergent, passing into the transverse groove above, and separated throughout by a broad, rounded, and but slightly elevated prominence. Antennae inserted far apart rather close to the clypeal margin, and moderately long, somewhat clavate; scape reaching about to the middle of the eyes, slender, flattened and a little widened towards apex; pedicel nearly equal to the first two funicle joints combined; first funicle joint slender and about a half longer than thick, the following joints about equal and a little shorter than the first, gradually widening distad, the second slightly longer than thick, the last two slightly wider than long; club wider than the funicle and obliquely truncate as in *Bothriothorax*. Mandibles broad at apex, with three strong acute teeth, the middle on somewhat the longest with other two somewhat diverging from it.

Thorax but slightly convex above, the scutum, axillae and scutellum lying in one plane; axillae transverse, acute within and moderately widely separated; scutellum rather wide and large, a little longer than wide, and rounded at apex, the sides gradually sloping, but becoming abruptly declivous towards apex which is strongly elevated above the

metanotum; propodeum very short and declivous at the middle, also declivous and moderately long at the sides, the metapleura rather large and forming an acute angle with the dorsal surface of the propodeum. Abdomen depressed, broadly ovate, slightly longer than wide and somewhat shorter than the thorax, the apex acute; vibrissal plates situated a little before the middle; ovipositor protruded about one-fourth the length of the abdomen, the sheaths slender and cylindrical; the fifth ventrite reaching to the apex and enclosing the base of the ovipositor.

Legs about normal in length and structure; middle tibiae considerably thickened at apex, the spur short and stout or hardly more than one-half as long as the first tarsal joint, which is a little thickened; the hind tibiae with a small but distinct spur. Wings broad; the marginal vein punctiform and emitting the stigmal before quite reaching the margin, postmarginal vein very short, the stigmal moderately long, not enlarged at apex but with a small spur.

Frontovertex and mesoscutum with shallow, thimble-like punctures as in *Bothriothorax* over a reticulate, shining surface; face delictaely shagreened and lineolate, transversely between the eyes, longitudinally on the prominence between the antennae and obliquely laterad of the antennal sockets, the scrobes and transverse groove smooth or nearly smooth; cheeks and postorbital region more coarsely longitudinally lineolate, enclosing a smooth area at the anterior orbits of the eyes; notum of thorax and the mesopleura finely, regularly reticulate, the axillae showing a slight trace of the thimble-punctures, the scutellum none; prepectal plates and tegulae more coarsely reticulate, the latter also more irregularly; the metapleura more finely reticulate than the mesopleura; abdomen above about as coarsely reticulate as the prepectal plates. Coloration metallic, the head in large part strongly refulgent, the thorax much less shining, the abdomen but little more than the thorax; wings hyaline.

Genotype: *Bothriothorax planifrons* Howard.

This genus without question is closely allied to *Bothriothorax,* but may be recognized by the peculiarities in the shape and structure of the head.

Bothriencyrtus insularis (Cameron).

Encyrtus insularis Cameron, Mem. Manchester Lit. & Phil. Soc., Vol. 10 (3rd Ser.), 1886, p. 243.

Bothriothorax insularis Ashmead, Fauna Hawaiiensis, Vol. 1, Pt. 4, 1901, p. 321.

Blepyrus insularis Perkins, Fauna Hawaiiensis, Vol. 1, Pt. 6, 1913, p. cvi.

Insularis is placed in *Bothriencyrtus* somewhat doubtfully as it is known only by description. If Cameron was right in

asserting that his specimen was a male and resembled *Bothriothorax* in some respects it may rightfully belong here, although the venation apparently is quite different, but perhaps not more so that sometimes occurs in opposite sexes within certain genera.[1] Cameron states that this species was found by Blackburn on several Islands, and if still present in the Islands and in our collections it can hardly be anything but *Blepyrus,* although I am quite unable to reconcile *Blepyrus* with Cameron's description.

Quaylea n. g.

Female: Head moderately thick, with the dorsal surface strongly convex, the face reflexed but the frons not prominent; in side view appearing triangular except that the dorsal side is rounded, the facial and dorsal sides subequal and considerably shorter than the occipital side; in frontal view appearing fully rounded above but becoming somewhat narrowed towards the mouth below the eyes; occiput slightly concave, with the neck inserted at the center; eyes medium-sized, touching the occipital margin posteriorly, and descending half way to the oral margin as seen in frontal view of head, in shape subtriangular with bulging sides and wider anteriorly, the inferio-posterior margin longest, the other two sides subequal; frontovertex moderately narrow, about two and a half times as long as wide and a little narrowed at the anterior ocellus; ocelli rather large, in an actue-angled triangle, the posterior pair touching the eye-margins and about their own diameter from the occipital margin, the anterior ocellus at the center of the frontovertex; cheeks about as long as the width of the eyes, with a short, delicate genal suture descending from the eyes; face about as wide as long, and as long as one-half of the head, the oral margin moderately wide and arched from side to side, the antennae separated by a low, rounded longitudinal ridge, the scrobes in the form of short, rather broad and deep impressions converging above and meeting acutely between the anterior corners of the eyes. Antennae inserted rather far apart and near the clypeal margin, rather short and slightly clavate; scape short or hardly reaching beyond the facial inflexion, compressed but not expanded beneath, the radicle joint about a third as long as the scape proper; pedicel of usual shape and a little less than twice as long as the first funicle joint, funicle joints except the last somewhat longer than wide and increasing slightly in thickness distad, the first joint shortest, the sixth about as wide as long; club oval, three-jointed, a little wider than the funicle and as long as the last three funicle joints com-

[1]For an example of this divergence in venation in the sexes consult the description of the male of *Encyrtus barbatus* above.

bined. Mandibles rather small, short and thick, tridentate at apex, with the lower tooth acute and rather long, the other two less acute and separated by a shallow emargination. Maxillary palpi four-jointed, the first three joints subequal, the first very slender at base, the fourth about twice as long as the third and triangular; labial palpi with three short joints, the first longest, the second shortest.

Thorax rather robust, convex above; pronotum and mesoscutum of usual shape; axillae short, transverse and acutely meeting or nearly so; scutellum rather large and acutely rounded at apex, strongly elevated and depressed on the disk, the sides abruptly declivous towards the base and more convex towards the apex; propodeum short at the middle, but lengthening towards the sides; metapleura not very large but reaching to the hind coxae, the metepimeron visible as a narrow sclerite between the meso- and metapleura; prepectal plates strongly chitinized and separated below from the mesopleura by a narrow sclerite which is probably a part of the mesosternum.

Abdomen triangular, strongly depressed, hardly more than half as long as the thorax; the vibrissal plates located about one-half way between the base and middle; the fifth ventrite not compressed but produced after death beyond the apex of the dorsum and enclosing the base of the ovipositor; protruded portion of the latter nearly as long as the abdomen, the sheaths slender and terete.

Wings with uniform discal ciliation, the marginal fringe short, the speculum distinct and wider below; costal cell rather wide; marginal vein about twice as long as thick, the stigmal about a third longer, the postmarginal a little longer than the stigmal; hind wings with the costal cell narrow throughout but reaching to the hooklets. Legs moderately long and slender; the middle tarsi with well developed spines on the plantar surface, the tibial spur as long as the first tarsal joint; hind tibiae with two apical spurs of which the inner is much the longer.

Sculpture very finely reticulate; the frontovertex with four rows of small punctures, the mesonotum including scutellum with numerous, minute setigerous punctures; scutellum more coarsely reticulate but becoming smoother and somewhat polished on the sides and apex; basal tergite of abdomen about as coarsely reticulate as the scutellum.

Eyes with a very fine, short pubescence; mesonotal pubescence rather long and bristle-like but not conspicuous; propodeum and metapleura bare except for a few whitish, fine hairs just behind and laterad of the spiracles; abdomen rather coarsely pubescent, the apex of the last tergite with a double row of moderately long bristle-like hairs; the ovipositor sheaths finely pubescent.

Coloration metallic black.

Male: Similar to the female with the head thinner and wider, the eyes smaller and more oval; the frontovertex much wider or as wide as long; the ocelli considerably larger, arranged in an equilateral triangle, the posterior pair touching the eye-margins and less than half their diameter from the occipital margin; scrobes converging, nearly meeting,

and then running parallel to each other for a short distance. Antennae inserted slightly higher up on the face yet still considerably below the level of the eyes; scape shorter and not quite so wide; pedicel no longer than thick and about one-half as long as the first funicle joint; funicle slender, the joints decreasing slightly in length distad, the basal joints twice as long as thick; club solid, slender, as long as the last two joints of funicle combined; the funicle and club to a less extent clothed with long, erect and numerous hairs above, and with considerably shorter, nearly decumbent hairs beneath. Sculpture about the same, except that the frontovertex is more coarsely or rugosely reticulate with scattered pin-punctures. Coloration the same with the metallic luster weaker.

Genotype: *Cerchysius whittieri* Girault, which without doubt is Ashmead's manuscript species, *Hemencyrtus crawii*.

This genus, which is dedicated to Prof. H. J. Quayle, who first made known the life-history of the type species, is most closely related to the *Hemencyrtus* Ashmead and much less closely I believe to *Cerchysius* Westwood.

The species belonging here are secondary parasites of Coccidae and parasitize the larvae of various other chalcid-flies such as *Scutellista, Tomocera* and *Microterys*. They pupate within the larval skin of their host which they transform into a brown puparium-like shell.

Quaylea alienа n. sp.

Female: Very closely structurally to *Q. whittieri* (Girault), on which the generic description is solely based, and differs only as follows: the frontovertex a trifle wider with the orbital row of pin-punctures less distinct; the pedicel twice as long as the first funicle joint, which is not over one-half as long as the second and about as long as wide, the following four funicle joints subequal in length and increasing slightly in width distad, each a trifle longer than wide, the sixth as wide as long and a trifle shorter than the preceding joint; the double, marginal fringe of hairs on the last tergite very much shorter and inconspicuous.

Length excluding ovipositor: .91 to 1.96 mm.

Coloration as in *whittieri* except that the mesonotum has a bluish and purplish luster instead of greenish; the frontovertex slightly more bluish, and the luster throughout more brilliant. Head deep blue-black, the frontovertex with a blue-green luster; notum of thorax bluish black, the scutellum and metapleura aeneous black with a strong green or bronzy green luster, the smooth sides and apex of scutellum and the metapleura refulgent, the underparts of thorax otherwise shining black; abdomen black, the dorsum and especially the basal tergite with a strong blue and

greenish luster; the ovipositor black. Antennae black, the flagellum appearing somewhat duller on acount of the grey pubescence. Legs black with the front knees very narrowly, apex of front tibiae, middle trochanters, a narrow annulus near base and apex of middle femora and apical fourth of the middle tibiae wtih spur and tarsi yellowish, the fringe of spines at apex of the middle tibiae and the plantar surface of the middle tarsi more reddish brown; front tarsi yellowish brown, the hind tarsi dark brown. Wings hyaline, the veins fuscous with the submarginal more yellowish.

Male: Differs structurally from the male of *whittieri* as follows: Frontovertex a little wider, and the pin-punctures less distinct; antennae considerably shorter, the scape and pedicel about the same, but the first funicle joint hardly longer than the pedicel, no longer and a little narrower than the sixth joint, the second to fourth joints nearly twice as long as wide the fifth a trifle shorter than the sixth, the latter about a half longer again than thick, the club equal to the last two funicle joints combined.

Length: .93 to 1.09 mm.

Coloration similar to that of the female (and practically identical with the male of *whittieri*) but the face except in the scrobes has a greenish luster instead of deep blue, and the metallic luster except on the head, the scutellum and metapleura is somewhat weaker, especially on the dorsum of the abdomen.

Described from 4 females (type and paratypes) collected on weeds infested with *Saissetia nigra* (Nietner), Honolulu, Oahu, July 7, 1916 (Timberlake); 7 females, 5 males (paratypes) reared from the same host, Honolulu, May 22 to June 6, 1919 (Timberlake); 2 females (paratypes, one with head missing) reared from *Scutellista cyanea* Motschulsky, Honolulu, Feb., 1906 (Kotinsky); 2 females (paratypes) reared from *Asterolecanium* species on bamboo, Honolulu, Sept., 1905 (Kotinsky); 2 females, 1 male (paratypes) reared from *Asterolecanium pustulans* (Cockerell), Honolulu, Dec., 1915 (Ehrhorn); 1 male (allotype) reared from the above Coccid, Diamond Head, Oahu, April 7, 1918 (Swezey); 3 females (paratypes) reared from *Coccus viridis* (Green) on coffee, Kona, Hawaii, Dec., 1915, Aug. 25, 1916, and Sept. 8, 1916 (Pemberton); 1 male (paratype) reared from *Saissetia hemisphaerica* (Targ.), Kona, Hawaii, Dec., 1915 (Pemberton); and 1 female (paratype) on *Dodonaea*, Kilauea, Hawaii, June 27, 1917 (Swezey).

This species is parasitic in various Coccids, but I have no doubt that it is always secondary. In the *Asterolecanium* it works undoubtedly on *Tomocera californica* Howard and in *Saissetia* and *Coccus* it probably parasitizes *Microterys kotinskyi* (Fullaway) and possibly both species of *Encyrtus,* as well as the *Scutellista* and *Tomocera.*

Coelopencyrtus n. g.

Female: Head as wide as the thorax, moderately thin fronto-occipitally, strongly convex above, the occiput slightly concave with the neck inserted near the center, the face inflexed; in side view subtriangular, the facial side hardly longer than the dorsal, the oral angle truncate; in frontal view subcircular, the cheeks but slightly converging below, the oral margin broad and slightly produced medially; frontovertex about two and a half times as long as wide, perceptibly widened at either end and narrowest at the middle; ocelli in a strongly acute-angled triangle, the anterior ocellus at the center of the frontovertex, the posterior pair almost touching the eye-margins and remote from the occipital margin; eyes medium-sized, strongly convex and nearly round except that the posterio-ventral orbits are nearly straight; cheeks somewhat longer than half the diameter of the eyes; face about as wide as long, and as long as the eyes, with a nearly semicircular depression forming the scrobes not quite reaching laterally to the lower orbits of the eyes and divided below by a broad, slightly elevated prominence between the antennae. The latter inserted near the oral margin and widely separated, rather small and subclavate; scape slender and moderatel thickened apically; pedicel slightly thicker at apex than the following joint and almost as long as the first four funicle joints combined; funicle increasing slightly in thickness distad, the first four joints subequal, transverse, the last two about twice as long as the preceding joints and quadrate, the sixth a little larger than the fifth; the three-jointed club large, oval, much broader than the funicle and as long as the four preceding joints combined. Mandibles medium-sized, strongly depressed, broad at base and with three acute teeth at apex, of which the ventral one is much the longest, the upper one smallest. Maxillary palpi four-jointed, the apical joint slenderly fusiform and nearly as long as the three preceding joints combined; labial palpi two-jointed with the apical joint shorter and slenderer than the first.

Thorax rather robust, moderately convex above, the sclerites of the mesonotum lying in one plane; pronotum short, slightly arcuate; scutum large, about twice as wide as long; axillae short, transverse, and nearly meeting medially; scutellum large, broadly rounded at apex, somewhat longer than wide, the disk flattened but the sides and apex highly elevated and strongly declivous; propodeum short at the middle and moderately long at the sides. Abdomen somewhat more than half as long and a little wider than the thorax, as wide as long, very broadly ovate and

subcordate at base, very strongly depressed, the vibrissal plates situated about half way between the middle and the base; ovipositor very short, not protruded, and enclosed by the fifth ventrite which reaches to the apex but is not at all compressed.

Legs of usual length and without special modifications; the middle tibiae moderately enlarged at apex, the spur as long as the first tarsal joint; the middle tarsi thicker than the other tarsi. Wings with the costal cell wide; the discal ciliation moderately dense, sparser on the basal part before the narrow speculum; marginal fringe very short and thick; marginal vein nearly punctiform or slightly longer than thick; stigmal moderately long or about equal to the marginal and postmarginal veins combined, somewhat enlarged at apex with a spur on the upper side, postmarginal about two-thirds as long as the stigmal; hind wings with the costal cell nearly absent.

Head and thorax very finely reticulate, the abdomen slightly more coarsely reticulate, all parts, especially head and notum, strongly shining; frontovertex with a few scattered, minute and shallow pin-punctures, the mesonotum with minute, seriated, setiferous punctures. Eyes with a fine, rather thick pubescence; rest of head with longer, moderately thick pubescence; mesoscutum and scutellum with numerous seriated, bristle-like hairs; abdomen finely, sericeously pubescent especially on the sides and apical margin; the pubescence blackish throughout and not conspicuous. Coloration metallic bluish and greenish black.

Male: Similar to the female except in the very peculiar and highly specialized head. This is a little longer than wide and subcircular in frontal view, very thin towards the mouth fronto-occipitally and gradually thickening above where it becomes about three times as thick as at the oral margin, the dorsal surface very strongly convex; frontovertex nearly as wide as long, with the frons very prominent and protuberantly produced forward beyond the eyes; the ocelli arranged in a large, equilateral triangle, the anterior one on a line with the anterior dorsal corners of the eyes, the posterior pair close to the eye-margins and remote from the rounded occipital margin; eyes subtriangular with the posterior orbits rounded; cheeks as long as the eyes; face strongly produced upward beyond the eyes and joining the frons in an acute angle, strongly obliquely reflexed and concave from the frontal angle to the antennal sockets as seen in side view, the upper part between and beyond the eyes flat from side to side, the remaining part above the antennae concave from side to side, the part below the antennae moderately convex.

Antennae inserted very far apart on the outer margins of the face next to the cheeks, and half way between the base of the mandibles and the eyes; short and strongly clavate; scape very short and incrassate, but little longer than thick, reaching not more than one-third of the distance to upper margin of face, in cross-section subtriangular, the lower side slightly hollowed to receive the pedicel, the other two sides convex, the outer margin in outline straight, the inner margin forming an arc

somewhat less than a semicircle; pedicel quadrate and somewhat longer than the first funicle joint; funicle joints no longer than wide and mostly transverse, increasing in width distad; the first narrowly transverse with a short, lamelliform projection at base on dorsal side and then obliquely sloping to apex; the second joint a little wider than long, the following two slightly narrower and about as wide as long; the last two joints increasing in width but not in length, the sixth nearly twice as wide as long; club solid, large, very broadly oval and rounded at apex, inclined somewhat obliquely to the funicle, not much longer than wide and as long as the last three funicle joints combined.

Frontovertex somewhat more rugulosely reticulate than in the female, with the same scattered, minute punctures; upper part of the face somewhat smoother and more shining, with a delicate, fine reticulation, and more thickly punctate than the frons, becoming somewhat polished medially just above the antennae and without a median carina; the sides of the face in a distinct area above the antennal sockets and reaching upwards narrowly to the eyes much more rugulosely shagreened than the rest of face, or closely, longitudinally lineolate next to the cheeks and eyes, more irregularly lineolate medially below, the sculpture on the whole being somewhat fingerprint-like; on each side near the middle of the face contiguous to the peculiarly sculptured area is a slight impression, small and circular; the convex part of the face below the antennae somewhat smoother than the dorsal part of the face, but with a similar reticulation.

Upper part of face with a dense, moderately long, erect, fine pubescence; the rest of face and frontovertex with a shorter, sparser pubescence; pedicel and first funicle joint with a short, dense, silky pubescence on the upper side, the following joints rather densely, and uniformly pubescent with fine, slightly longer hairs.

Genotype: *Coelopencyrtus odyneri* n. sp.

Besides *odyneri* there is at least another species present in the Islands which differs in the male sex in having a median carina on the face just above the antennae, the pedicel wider than long, and the first two funicle joints very short, transverse and produced on the outer side into short rami.

The species of *Coelopencyrtus* are parasitic in the larvae of *Odynerus*, many of the parasites issuing from a host, which becomes inflated and filled with cells somewhat like lepidopterous larvae which have been parasitized by *Copidosoma*. The species may therefore be polyembryonic, although both sexes usually issue from the same host, which could hardly be the case if all developed from a single egg.

In the female sex *Coelopencyrtus* is similar to *Ageniaspis*, and is apparently most closely allied to that genus but differs in the venation, sculpture, pubescence, etc., while the male because of its peculiar head is entirely different from any genus described in the family. In Ashmead's tables *Coelopencyrtus* (together with *Ageniaspis*) agrees best with the polyembryonic *Copidosoma* group, and runs to *Prionomitus* Mayr which probably does not really belong to this group.

Coelopencyrtus odyneri n. sp.

Female: Structural characters as given in the generic description.

Length: 1.10 to 1.47 mm.

Head blue-black with a metallic purple and greenish luster; mesoscutum strongly metallic green-black, the rest of the thorax and the abdomen black, shining but not metallic except that the axillae and scutellum have a comparatively weak and mostly bluish luster; mandibles brown, the palpi yellow. Antennae black, the flagellum appearing grayish brown on account of the pubescence mostly. Legs black, with the tibiae more fuscous; trochanters, tibiae narrowly at each extremity, and tarsi of front legs, the hind tibiae along the ventral and apical margin and the hind tarsi brownish; trochanters, femora at base, tibiae except towards the base and the tarsi of the middle legs brownish yellow. Wings hyaline with a slight smoky cast most prominent on the basal half, the veins fuscous.

Male: Structural characters as given under the generic heading.

Length: 1.27 to 1.53 mm.

Coloration as in the female except that the frontovertex and the upper part of the face are duller greenish black with a weaker not at all bluish luster, the flagellum more strongly brownish.

Described from 125 females, 2 males (type, allotype and paratypes) reared Feb. 22-23, 1916, from a larva of *Odynerus nigripennis* (Holmgren) collected Feb. 6, Waialae, Oahu (Swezey), and 25 females, 3 males reared April 2-5, 1916, from the same host in reproduction from a female of the above lot (Timberlake). The males in each case issued a day in advance of the females; from the first hast a total of 2 males and 136 females (besides 2 or 3 more that escaped) issued, and from the second 3 males and 49 females.

Coelopencyrtus swezeyi n. sp.

Ageniaspis species, Swezey, Hawaiian Sugar Planters' Exp. Sta., Ent. Bull. 5, 1907, p. 52, pl. 6, fig. 6.

Female: In structure and coloration hardly distinguishable from *C. odyneri,* but the pubescence on the head slightly thicker and rather longer on the frontovertex, the pleura often somewhat brownish, the frontovertex in the typical series from Hawaii strongly metalic purple but in the Oahu series rather duller than in *odyneri* and inclining to greenish.

Length: .96 to 1.49 mm.

Male: Differs from the male of *odyneri* in having the head a little thinner above or hardly over twice as thick dorsally as at the oral margin; the frontovertex fully as wide as long with the frons rather more protuberant; anterior ocellus much closer to the anterior margin of the frons, the ocelli otherwise arranged the same; the face with a median carina above the antennae; the area of differentiated sculpture above the antennal sockets regularly and closely lineolate medially and more irregularly lineolate towards the eyes. Scape somewhat narrower with its outer margin slightly but distinctly arcuate; pedicel strongly produced on the outer side so that it is twice as wide as long and subquadrangular as seen from above; flagellum much shorter; first funicle joint thinly discoidal, being very short and transverse, produced upward and also on the outer side into a short ramus; second joint short and transverse but not discoidal, produced on the outer side but not upward, its ramus somewhat shorter than the first; next two joints about twice as wide as long, the third subproduced laterally; last two funicle joints longer and somewhat wider than the fourth, the sixth about a half wider again than long; club nearly as in *odyneri* although somewhat smaller. Pubescence on the upper part of the face slightly longer and the tuft of fine, short hair on the pedicel somewhat thicker. Coloration as in *odyneri* with the pleura and antennae more brownish, the apex of the flagellum becoming distinctly brown.

Length: 1.05 to 1.38 mm.

Described from 61 females, 11 males (type, allotype and paratypes) reared from *Odynerus nigripennis* (Holmgren), Pahala, Hawaii, Dec. 7, 1905 (Swezey); 2 females (paratypes) taken on a rock near an *Odynerus* nest, Pahala, Hawaii, Dec. 7, 1905 (Swezey); 40 females, 8 males (paratypes) reared from *O. nigripennis,* Tantalus, Oahu, Dec. 20, 1908 (Giffard); and 56 females, 4 males (paratypes) found dead in *Sceliphron* cells occupied by *O. nigripennis,* Makiki Valley, Oahu, Jan. 16, 1916 (Swezey and Timberlake).

From the Pahala *Odynerus* larva Swezey reared 101 parasites in all, and Giffard reared aproximately 275 from three larvae.

Nesencyrtus n. g.

Closely allied to *Coelopencyrtus* and similar except as follows:

Female: Head considerably shorter and thicker, in frontal view noticeably wider than long, subquadrate with the dorsal margin rounded, the oral margin truncate; in side view with the cheeks very thick at the oral margin fronto-occipitally, or nearly one-half as thick as the head at the anterior corners of the eyes; frontovertex rather wide and one-half as wide as long; ocelli in a nearly equilateral triangle, the anterior one not far behind a line connecting the anterior corners of the eyes, the posterior pair close to the eye-margins and rather remote from the occipital margin; eyes relatively smaller with the anterior and dorsal orbits much less rounded; face broader, the scrobal impression not reaching quite so far upwards towards the eyes, the elevation between the antennae a little more prominent, the clypeus broadly produced medially as in *Coelopencyrtus* and nearly discreted as a separate, narrowly transverse sclerite projecting over the mouth-opening; cheeks as long as their own width above or as long as the width of the eyes. Antennae much shorter and very strongly clavate; the scape moderately long, reaching to the upper limit of the face and including the radicle as long as the flagellum, compressed and slightly expanded below, with an excavation on the apical half of the under side to receive the pedicel; the latter strongly thickened at apex, wider than the first and somewhat longer than the first three funicle joints combined; funicle joints all much shorter than wide, increasing strongly in width distad and slightly in length, the sixth nearly twice as wide as the first; club large, broadly oval, rounded at apex, much wider than the funicle and about as long. Mouth-opening very large to accommodate the unusually large mandibles; these are flattened, somewhat curved inward apically, the apex hardly narrower than the base with three strong, acute teeth, the inner tooth somewhat shorter and blunter. Maxillary palpi somewhat shorter, the apical joint considerably shorter than the three preceding joints combined.

Thorax somewhat more depressed, the scutellum less strongly elevated and declivous at the sides especially towards the apex; the axillae meeting medially, abdomen similar, the ovipositor internally longer, and slightly protruded. Wings and legs practically the same; sculpture and pubescence similar to *Coelopencyrtus*.

Male: Head much thinner than in the female, the frons not protuberantly produced beyond the eyes as in *Coelopencyrtus;* frontovertex a little wider than long; ocelli in a right-angled triangle, the posterior pair

nearly touching the eye-margins and not much more than their own diameter from the slightly rounded occipital margin; face no longer than wide and not produced upward beyond the eyes as in *Coelopencyrtus,* although strongly concave lengthwise above the antennae. The latter inserted slightly further apart than in the female although hardly higher up on the face, somewhat longer than in *Coelopencyrtus,* not clavate, but with the first four funicle joints shortly ramose on the inner side; scape much longer, not triangularly thickened but on the contrary rather strongly compresesd and somewhat dilated below, with a groove on the outer surface to receive the pedicel; the latter triangular and no longer than wide at apex, the first funicle joint longest, the last two but little shorter, the first four much wider than long, being produced on the inner side into moderately long rami, of which the third is longest, the first shortest; last two funicle joints subtriangular, narrow at base and somewhat wider at apex than long; club solid, oval, no wider than the preceding joint and a little shorter than the last two funicle joints combined.

Sculpture similar to that of *Coelopencyrtus* male, but the area above the antennal sockets not nearly so distinctly differentiated, being extremely finely lineolate; on each side of the middle of the face contiguous to these areas is a lunulate or subangular impression where the separate curvatures of the lower and upper parts of the face meet; these impressions are highly polished and shining and are separated medially by a smoothish, slight ridge, which widens a little above but soon becomes obsolete. Pubescence about as in *Coelopencyrtus;* the pedicel shortly, rather densely pubescent on the upper side, the following joints with much longer, rather abundant pubescence, which is also present on the rami.

Genotype: *Adelencyrtus kaalae* Ashmead.

This genus is only remotely related to *Adelencyrtus* in which Ashmead placed his species, and hardly resembles it even superficially, although it must be remarked that *Adelencyrtus* even at its inception was not at all homogeneous.

Nesencyrtus kaalae (Ashmead).

Adelencyrtus kaalae Ashmead, Fauna Hawaiiensis, 1, Pt. 3, 1901, p. 323.

The male, hithertofore unknown, closely resembles the female except in the points brought out in the generic description.

I have examined 4 females from Oahu: Tantalus (Giffard), Opaeula and Kalihi (Swezey), and one determined by

Ashmead from Kaala (Perkins); also many specimens from Kilauea, Hawaii, one female taken by Swezey, the rest including both sexes reared from larvae *Nesoprosopis pubescens* Perkins, found nesting in an old rotten log (Williams).

Aphycomorpha n. g.

Most closely related to *Aphycopsis* Timberlake and *Anagyropsis* Girault, although very similar to *Aphycus* Mayr.

Female: Head a little wider than long, rather thick, the cheeks convergent towards the truncate mouth, the face reflexed, the frons rather narrow and not prominent; eyes rather small, very broadly oval; frontovertex two and a half times as long as wide at the middle, being widened both anteriorly and posteriorly; ocelli arranged in an acute-angled triangle, the anterior one at the center of the frontovertex, the posterior pair almost touching the eye-margins and remote from the occipital margin; face and cheeks as long as the eyes, the scrobes in the form of a triangular impression divided below by a median, moderately elevated ridge between the antennae. Antennae inserted close to the clypeal margin and formed much as in *Aphycus;* the scape compressed, but not expanded beneath; the pedicel about as long as the first three funicle joints combined; funicle joints all a little wider than long, increasing distinctly in width and more slightly in length distad; the club large, oval, wider than the funicle and as long as the five preceding joints combined. Mandibles with an acute ventral tooth, and a broad dorsal one.

Thorax robust, the dorsum slightly convex; the collar of pronotum short, narrowly transverse and scarcely arcuate; mesoscutum nearly twice as wide as long, the posterior margin slightly sinuate on either side of the middle which is slightly produced caudad; axillae much wider than long and nearly meeting at the middle; scutellum very large, somewhat longer than wide, the sides slightly rounded in outline and strongly declivous, the apex rounded; propodeum very short at the middle and not greatly enlarged laterally. Abdomen very small, scarcely one-half as long as the thorax, depressed, triangular with the basal corners rounded and the apex rather acute; the vibrissal plates situated a little before the middle just within the lateral margin on the ventral side; fifth ventrite reaching half way between the middle and apex; ovipositor internally reaching nearly to the base of the abdomen, apically free beyond the fifth ventrite and slightly protruded.

Legs stout, moderately long, the middle tibiae much enlarged at apex and the middle tarsi strongly incrassate. Discal ciliation of wings dense and uniform, the speculum widened below, marginal fringe short and dense; submarginal vein broken where it joins the thickened apical part, the basal portion with six long bristles which gradually shorten on either side of the longer middle ones; marginal vein nearly twice as

long as thick, the stigmal moderately long, straight, slender with the apex much enlarged, the postmarginal as long as the slender part of the stigmal.

Sculpture of the head very finely alutaceous and opaque; the thorax slightly shiny and microscopically reticulate; the abdomen more shining and more coarsely reticulate. Eyes with a short, rather thick pile; the frontovertex with a very fine, inconspicuous blackish pubescence; collar of pronotum and the mesonotum with much coarser, black bristle-like hairs arranged more or less seriately on the scutum and scutellum. Coloration non-metallic yellowish.

Male: Head considerably thinner than in the female, the eyes smaller; the frontovertex somewhat wider than long; ocelli arranged in a right-angled triangle, the posterior pair situated rather close to the eyes and the occipital margin. Antennae inserted higher up on the face yet below the level of the eyes; the scape similar, the pedicel short and thick, or hardly longer than wide, the flagellum elongate, not thickened distad and with long subverticillate hairs which are much shorter on the under side; funicle joints all about equal in length and twice as long as wide, deeply incised on the upper side at the articulations; club solid, elongate elliptical, acute at apex, somewhat shorter than the last two funicle joints combined and no wider, the abundant hairs gradually shortening towards the apex.

Thorax, abdomen, legs and wings about as in the female; the abdomen fully as large as in the female; the middle tarsi not much thickened at base although attenuated towards apex, yet nevertheless much more robust than the front or hind tarsi.

Sculpture somewhat similar although the frontovertex is a little more coarsely and rugulosely alutaceous and the mesonotum is very finely and closely rugulosely reticulate; pubescence the same yet much less conspicuous as it is concolorous with the black head and thorax.

Genotype: *Aphycomorpha araucariae* n. sp.

This genus differs from *Anagyropsis* in having the scape narrow, not broadly expanded beneath, in the more opaque, alutaceous and less reticulate sculpture, and in having the general form of the body much less robust. From *Aphycopsis* it differs in having the frontovertex much narrower, the oral margin of face truncate instead of distinctly emarginate, in the compressed, non-clavate scape, in the broken submarginal vein, and the somewhat longer marginal. These three genera all agree in the shape of the mandibles.

Aphycomorpha araucariae n. sp.

Female: For the structural characters consult the generic description. Length, .79 to 1.03 mm.

Head, pronotum, metanotum, propodeum and underparts of thorax primuline yellow (Ridgway), a little brighter on the occiput and face, the vertex often darker or nearly like the mesonotum; the latter and the tegulae ochraceous orange (Ridgway); abdomen brownish black with the dorsal apical margin yellowish, the venter blackish or at least dusky in the center, yellowish at apex beyond the fifth ventrite, the base broadly yellow at the middle and more narrowly yellow at the sides. Antennae dusky yellow becoming more infuscated on the first two funicle joints, the club brownish black; legs concolorous with underparts of thorax, the apex of the last joint of the tarsi blackish. Wings hyaline with a slight or inconspicuous smoky cloud on basal half extending to the apex of the stigmal vein, more distinct just below the stigmal and the break in the submarginal vein, and enclosing below the apex of the submarginal a clear oval area which includes the speculum and extends two-thirds of the way across the disk; the veins fuscous.

Male: Structural characters as given under the generic heading.

Length: 88 to 1.05 mm.

Coloration black, the thorax and abdomen slightly shining, the head opaque; the face brownish black with the prominence between antennae, the oral margin and the mandibles yellowish brown. Scape dusky yellow, the pedicel and flagellum translucent fuscous with a yellowish cast; front and middle legs nearly as in the female, the hind legs blackish brown with the trochanters, apex of the tibiae and the tarsi brownish yellow. Wings entirely hyaline, the veins fuscous.

Described from 5 females (type and paratypes) reared from *Eriococcus araucariae* Maskell, Moanalua Gardens, Oahu, near Honolulu, May 1-7, 1918 (Timberlake); 18 females, 9 males (allotype and paratypes) from the same host and locality, May 26 to June 12, 1919 (Timberlake); and 4 females, 3 males (paratypes), reared from the same host, Honolulu, Nov. 24 to Dec. 1, 1917 (Fullaway). The oldest specimens examined are three females and a male reared from the same host at Honolulu, July, 1906 (Kotinsky) but they are too much broken to serve as paratypes.

Anicetus annulatus n. sp.

Female: Head considerably wider than long and wider than the thorax; the dorsal surface transversely suboval, horizontal and only slightly convex from side to side; eyes rather broadly suboval, the inner orbits nearly straight and moderately arcuately diverging anteriorly; fronto-

large and arranged in an acute-angled triangle, the anterior one somewhat behind the center of the frontovertex, the posterior pair about one-half their own diameter from the eye-margins, a little over their own diameter apart and nearly twice as far removed from the occipital margin; cheeks fully as long as the eyes and very strongly convergent towards the mouth; the face wider than long, strongly obliquely reflexed and meeting the frons in an acute and carinated angle, which is nearly transverse between the eyes and curved forward and downward in front of the eyes to separate the face and cheeks for a short distance, upper part of face rather deeply concave and divided by a broad median elevation ascending from between the antennae. The latter inserted far apart, a little less than half way from the oral margin to the eyes; scape compressed, dilated beneath, triangular in shape, with the base narrow, the apex broad, the apical corners rounded; pedicel somewhat longer than the first three funicle joints combined, about three-fourths as wide at apex as the sixth funicle joint, triangular with the apical ventral corner produced forward and downward so that the ventral margin is noticeably longer than the dorsal, and the apical margin slightly concave; funicle joints all very short and transverse or foliaceous as taken together, the first joint the longest medially, the sixth much longer on the dorsal margin than any of the preceding, the first but slightly narrower transversely than the sixth; club very large, compressed and obliquely truncate on the apical margin about one-half the way to the base, somewhat wider than the funicle and as long as the funicle and pedicel combined, the sutures, especially the one between the second and third joints, obsolete.

Thorax considerably wider than its depth, the notum moderately convex; pronotum very short, transverse and somewhat arcuate, mesoscutum not quite twice as wide as long, its posterior or basal margin nearly straight; axillae short, transverse, nearly or actually meeting medially; scutellum large, a little longer than the scutum or its own width, rather broadly rounded at apex, the sides a little rounded and but slightly elevated or declivous; propodeum very short at the middle, rather long at the sides and obliquely declivous from the base towards the apex, metapleura oblique, rather small and somewhat narrowed below where touching the hind coxae. Abdomen slightly wider than the thorax and two-thirds as long, strongly depressed, very broadly ovate or approaching rotundity, widest just before the middle where the vibrissal plates are situated, the basal corners rounded, the apex obtusely angled or rounded, the ovipositor barely protruded.

Legs rather short; the middle tibiae not much enlarged at apex, the spur as long as the first tarsal joint; the middle tarsi considerably stouter than the other tarsi but not incrassate, cylindrical and not tapering towards apex. A large central area of the disk of fore wings strongly inflated from below as in related species, the area reaching about one-eighth of the wing-length from apex, its apical margin semicircular; disk finely, moderately densely ciliated, the basal part with a group of much coarser or bristle-like hairs just before the speculum and extending a vertex two and a half times longer than the width at the ocelli; the latter

little more than half way across the disk; the base before these bristles and a narrow longitudinal area beneath the apical part of the venation bare; speculum reaching from the latter area obliquely to the basal area, much narrowed above and overhung by the bristle-like hairs; marginal fringe rather short and moderately dense; marginal vein about twice as long as thick, equal to the stigmal, the postmarginal somewhat shorter and forming an acute angle with the stigmal; marginal and postmarginal veins with a row of six bristle-like hairs of which the one at the apex of the postmarginal is much the longest.

Head, abdomen and thorax except the scutellum smooth and highly polished, the scutellum with an extremely minute, granular alutaceous sculpture; surface of the antennae rather opaque, the scape with relatively coarse reticulations. Eyes with a short, fine and rather thick pile; frontovertex with four rows of very fine, but rather long, pale-colored hair of which the orbital rows are inclined forward, the others backward; mesoscutum with similar, sparse, scattered hairs, the apical margin near the middle with a pair of longer, bristle-like black hairs; scutellum with two pairs of still stouter, longer black bristles, one pair near apex, the other but slightly further apart just behind the middle, the disk also with a few fine hairs. Dorsal margin of the pedicel and flagellum and the ventral apices of the pedicel and funicle joints provided with numerous, black, bristle-like hairs, the sides of the club with similar, shorter hairs.

Length: .78 to 1.18 mm.

General color of head, thorax and venter about ochraceous orange (Ridgway); the face and cheeks paler yellow with a rather wide transverse fuscous to blackish band across their middle, passing through the base of the antennae and curving upward on the median facial prominence; an oblique band on each side of the prosternum extending forward from the coxae, black; frontovertex, mesoscutum and mesopleura washed with a distinct but not very strong purplish luster; propodeum and metanotum blackish on each side of the middle, the metapleura with an oval to oblong spot on the upper part, brilliant, metallic, pale green; abdomen except the venter black with a bluish luster medially at the base, the sides on the basal half brilliant, bright green, the sides very broadly on the apical half about antimony yellow (Ridgway). Antennae concolorous with the frontovertex, the radicle joint and ventral margin of the scape narrowly black. Legs somewhat paler yellow than the thorax with the apex of the tarsi, the first joint of the hind tarsi and two annuli on the hind tibiae black, the first tibial band situated close to the base, the second just beyond the middle. Wings subhyaline; a broad area across the disk opposite the apical third of the venation and the extreme base smoky; apical part of disk beyond the venation slightly infuscated and more deeply so in a narrow band encircling the inflated area, leaving the apical margin clear; veins yellowish with the marginal more brownish.

Male: Much different from the female and considerably like the male

of *Cerapterocerus;* head in general shape similar to the female but much thinner and the frons not so prominent; frontovertex slightly wider than long, the ocelli in a nearly equilateral triangle, the posterior pair about their own diameter from the eye-margins and the occipital margin; cheeks considerably longer than the eyes and very strongly convergent towards the mouth; face wider than long, obliquely reflexed and meeting the frons in an acute angle, with a prominent median ridge from the oral nearly to the frontal margin, and deeply, somewhat triangularly hollowed on either side of the ridge. Antennae inserted moderately far apart near the middle of the face nearly on a line with the anterior corners of the eyes, the scape very short, excluding the radicle no longer than the pedicel and the first funicle joint combined, compressed and twice as long as wide; pedicel no longer than thick; flagellum slender and elongate, not thickening towards the apex, the funicle joints with long, subverticillate hairs, the club with similar scattered hairs shortening towards the apex; the first funicle joint somewhat longer than the second to fourth, the last two still longer, the first a half longer than wide, the fifth about twice as long as wide, the sixth a little shorter, each, especially the second to the fifth, deeply incised at the articulations so that the second to fourth are subtriangular; club nearly as long as the last two funicle joints combined, narrow, acute at apex and solid.

Mesoscutum much larger than in the female and much longer or hardly a fourth wider than long; axillae triangular, being longer and not so wide and more distinctly separated medially; scutellum much smaller or no longer than wide and much shorter than the scutum; abdomen about the same as in the female although hardly wider than the thorax and less rounded on the sides. Wings much wider and shorter; the disk not inflated and uniformly ciliated, with the cilia before the speculum but slightly larger and extending in a group across the disk, the basal bare area much smaller; the marginal, postmarginal and stigmal veins all shorter but keeping about the same proportions to each other.

Face shining and very finely or microscopically reticulate; frontovertex finely, closely granular and rather opaque; mesoscutum finely, transversely reticulate, sometimes appearing minutely rugulose, and but slightly shiny; scutellum crowded with fine granular reticulations somewhat longitudinally lengthened, appearing velvety opaque in some lights and metallic in others, the declivous part of the apical margin becoming smooth and polished; axillae, propodeum, pleura and abdomen comparatively smooth and shining. Pubescence except on the eyes more abundant than in the female; frontovertex with six rows of fine hairs inclined backward, and a few hairs on the occipital margin inclined forward; the pubescence on the mesoscutum more distinctly arranged seriately; the fine hairs on base of scutellum longer, the anterior pair of bristles more widely separated.

Length: .68 to .86 mm.

General color black and weakly metallic in large part; frontovertex brown; the face with a slight greenish luster; scutellum slightly metallic;

greenish in some lights and more strongly so on the apical margin; mesopleura with a rather strong purple luster, the metapleura strongly metallic green; the abdomen slightly bluish black and shining. Scape and pedicel blackish, the flagellum dusky yellow with the verticillate hairs black. Front and middle legs pale yellow, the front tibiae broadly at the middle and the basal third of the middle tibiae fuscous; hind legs fuscous, the tibiae more blackish, the trochanters, the tibiae narrowly at base and on the apical fifth, and the tarsi pale yellow; apex of all the tarsi black. Wings entirely hyaline, the veins mostly yellowish, the marginal vein fuscous.

Described from 2 females, 3 males (type, allotype and paratypes) reared from *Eucalymnatus tessellatus* (Sign.), Honolulu, Oahu, Nov. 26 to Dec. 1, 1917 (Fullaway); 1 female (paratype) supposed to have been reared from *Saissetia hemisphaerica* (Targ.), Honolulu, April 25, 1912 (Fullaway); 1 female (paratype) collected on *Cyrtandra,* Niu, Oahu, Feb. 1, 1914 (Swezey); and 3 females, 1 male (paratypes) reared from *Eucalymnatus tessellatus,* Puu Kapele, Kauai, Feb. 14, 1915 (Swezey).

Examination of the host remains mounted with the Kauai specimens indicates that the parasite is unquestionably a primary parasite and that only one issues from the nearly full-grown scale. The record from *Saissetia* needs confirmation before being accepted.

OFFICERS ELECTED FOR 1919.

President.....W. M. Giffard
Vice-President.....D. L. Crawford
Secretary-Treasurer.....D. T. Fullaway

Messrs. Muir and Giffard were appointed a Committee to consider desired changes in the Constitution and By-Laws.

The Treasurer reported a balance in the treasury of $57.38.

Miscellaneous Notes and Exhibits of Insects Collected at Puuwaawaa, North Kona, and Kilauea, Hawaii.*

BY W. M. GIFFARD.

The following exhibits were collected on a short visit to Puuwaawaa, North Kona, Hawaii, August, 1917.

Rhyncogonus sp.—One specimen collected on *Acacia koa* in the mountains at an elevation of approximately 3800 feet. It is the first specimen of this genus to be collected on the Island of Hawaii. It was sent to Dr. Sharp who has described it as new under the name *R. giffardi.* (See page 80 of this issue of the Proceedings).

Clytarlus nodifer.—Four perfect specimens collected on *Acacia koa.*

Calandra oryzae.—Two specimens of this common domestic grain weevil collected on *Acacia koa.* This is apparently the first record of this insect being taken in the high forest regions. Possibly it may attack the seeds of *Acacia koa* but the trees in this locality were not noticed to be in fruit at the time.

From a few seeds and seed pods with stalks attached of the rare *Hibiscadelphus hualalaiensis* collected on this visit by Mr. J. F. Rock, I bred out the following aggregation of insects:

Lepidoptera.—Four specimens of the pink boll-worm *(Pectinophora gossypiella).*

Parasitic Hymenoptera.—One specimen of *Spalangia* sp., probably *simplex* which parasitizes small Diptera.

One specimen of *Angitia blackburni.*

Diptera.—One specimen (undetermined).

Neuroptera.—Two Pscocids (undetermined).

Hemiptera.—One *Nysius* sp. (undetermined).

Coleoptera.—Two specimens of Anobiids (2 undetermined species).

*These notes were presented by Mr. Giffard at the October, 1917, meeting, but were inadvertently omitted from the records and thus missed being printed in the Proceedings for 1917. As considerable importance is attached to some of them, they are printed at this time. —[Ed].

Eleven *Proterhinus* (2 undetermined species).

NOTE:—It is interesting to note that *Pectinophora gossypiella* attacks the seeds of *Hibiscadelphus* and is not confined (as Mr. Busck has stated) to *Gossypium*. The *Hibiscadelphus* are indigenous but exceedingly rare in our native forests, and whilst a species of so-called "red cotton" *(Kokia Rockii)* is sparsely distributed in the forests of one section of North Kona, yet it is not the true cotton and Mr. Rock informs me that on many visits to the region he has never noticed that the "red cotton" bolls were ever atacked by anything approaching *Pectinophora*. Mr. Busck however records the fact that Lefroy has bred it from *Hibiscus* (an ally of *Hibiscadelphus*) in India.

It was also interesting to note that one can breed out of the stalks and seed pods of *Hibiscadelphus* so many insects of various Orders, although it may be taken for granted that some of these are more particularly attached to other trees than the particular one referred to.

From the flower heads of *Raillardia ciliolata* collected at Kilauea, October, 1917, a good series of the following insects were bred:

Diptera.—*Tephritis* sp., a good series of an undertermined species.

Homoptera.—*Nesosydne raillardiae*, one nymph.

Parasitic Hymenoptera.—Eight *Phanurus vulcanus* Perk. This is probably parasitic on the eggs of a bug (*Nysius* sp.), as Mr. Swezey in examining the flower heads found several empty bug eggs similar to *Nysius* eggs previously found by him in the flower heads of *Bidens*.

Two Eulophids *(Tetrastichus* sp.). These issued from puparia of the *Tephritis* as Mr. Swezey found, on later examination, two puparia having exit holes made by some parasite. Mr. Timberlake examined these *Tetrastichus* specimens and pronounced them as belonging to an undertermined species. It is apparently a native insect, and the first native species of the genus to be recorded in the Hawaiian Islands.

Mailed July 15, 1919

Muir, F.:
On the Genus Hurmia, Walk. (Homoptera, Delphacidae) 48
New Hawaiian Delphacidae (Homoptera) 64

Sharp, D.:
Studies in Rhynchophora (Coleoptera) V. The Genus Rhynchogonus 77

Swezey, O. H.:
Maui Insect Notes 2
Insects Occurring on Plants of Lobelioideae in the Hawaiian Islands 9

Timberlake, P. H.:
Annual Address. Observations on the Sources of Hawaiian Encyrtidae (Hymenoptera) 188
Descriptions of New Genera and Species of Hawaiian Encyrtidae (Hymenoptera) 197

Williams, F. X.:
Epyris, gutturosus (Bethylidae), a Fossorial Wasp that Preys on the Larva of the Tenebrionid Beetle Gonocephalum Seriatum 55
Some Observations on the Leafhopper Wasp, Nesoanthidium Hawaiiensis (Hymenoptera) 65
Some Observations on Pipunculus Fries which Parasitize the Cane Leafhopper (Diptera) 68

Rules and Suggestions Applying to Types and Entomological Descriptions and Papers in the Publications of the Hawaiian Entomological Society 44

Paradise Print